THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXI. No. 783.] LONDON, MAY 14, 1878. [30th Year.] Price 6d.

COMPLETION of the FIRST VOLUME
OF
KING'S TREATISE
ON THE
SCIENCE AND PRACTICE
OF THE
MANUFACTURE
AND DISTRIBUTION
OF
COAL GAS.

[*For detailed announcement, see page 772.*]

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These Paints are now used in over 200 Country Gas-Works, and by all the London Gas Companies, on Gas-boilers, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
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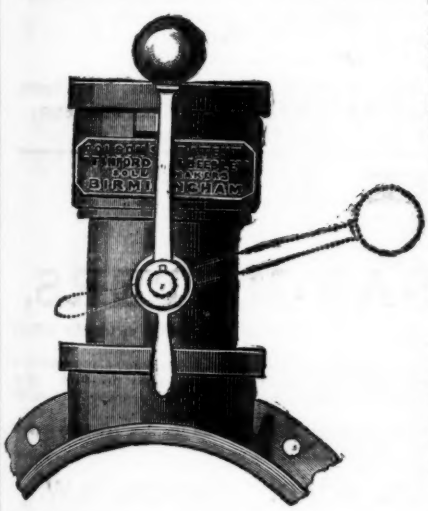
Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

COLSON'S PATENT ASCENSION-PIPE THROTTLE-VALVE.



THIS Valve is designed to supersede the hydraulic seal, and is intended to be placed immediately in or on the retort mouthpiece, or at such a distance therefrom as to be within reach of the workman. By the use of these Valves, the whole of the pressure is removed from the retorts, and a largely increased make of gas per ton obtained; the deposit of carbon is very slight, choked ascension-pipes are unknown, and the quality of the coke is improved.

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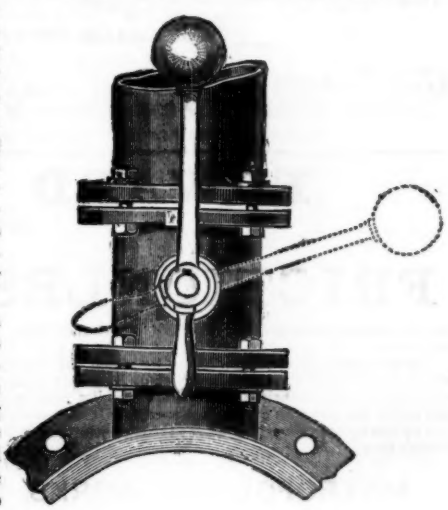

Upwards of one hundred of these Valves have been continuously at work during the past six months at the Windsor Street Works of the Corporation of Birmingham, and no difficulty has been experienced in working retorts fitted with them in combination with others worked in the usual way with the hydraulic seal.

The following important testimonial has been received:—

Corporation of Birmingham Gas Department, Windsor Street Works, Feb. 17, 1878.

MESSRS. STANFORD AND BEESLEY.

DEAR SIRS,—In reply to your inquiry, I beg to say that the Valves (Colson's Patent) supplied by you in July last have given entire satisfaction. The retorts fitted with them are worked side by side with others having the ordinary dip-pipe, without any difficulty being experienced.

Yours truly, (Signed) CHARLES HUNT.

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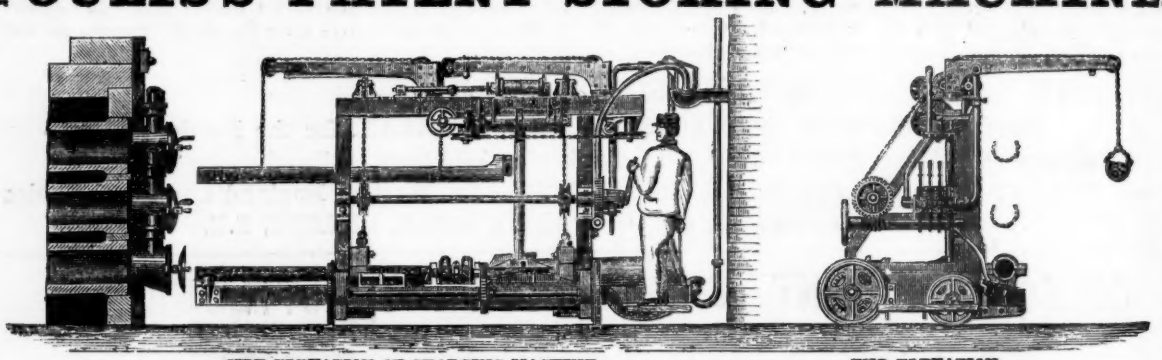

SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(The Drawing Machine will be Illustrated in next week's Advertisement.)

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In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

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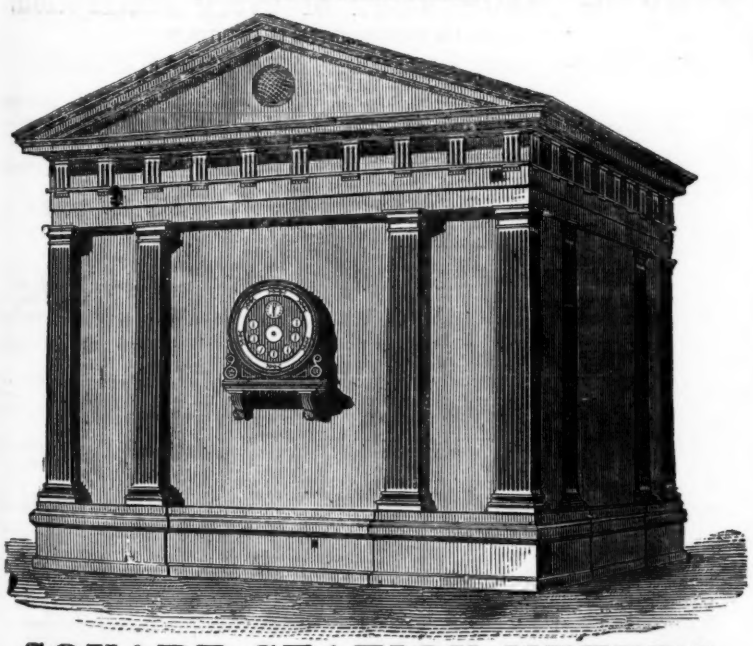

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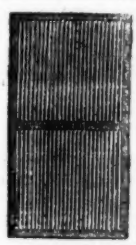

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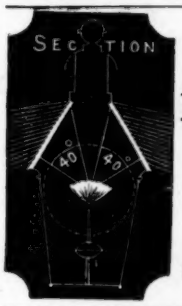

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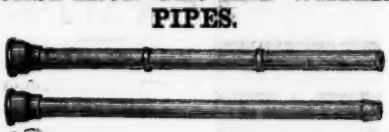

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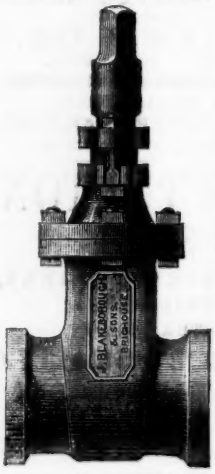

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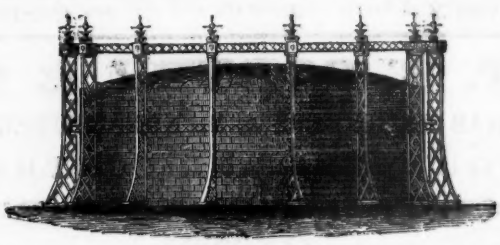

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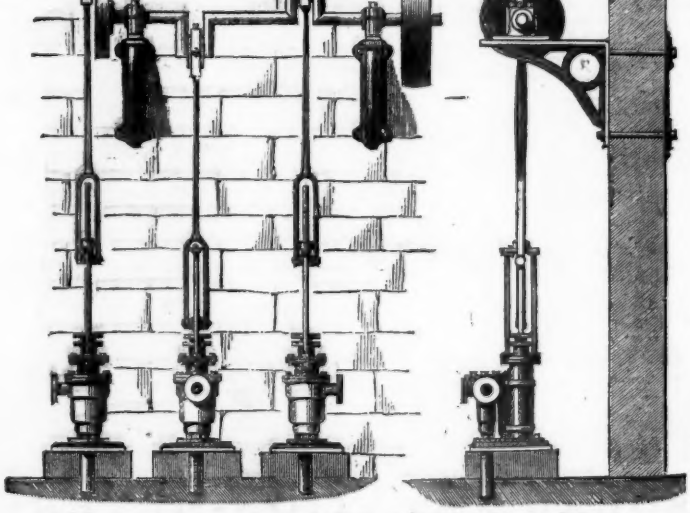
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,
WHITEFRIARS STREET, FLEET STREET, LONDON, E.C.,
Hydraulic Engineers,
AND MANUFACTURERS OF
PUMPING MACHINERY of every Description.
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT DIRECT-ACTING STEAM-PUMPS.



IMPROVED DOUBLE-ACTION PUMPS.
For Water. For Tar. For Ammoniacal Liquor.
This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction.
These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.
GAS SYPHON PUMPS, IN COPPER OR SHEET IRON, ALWAYS IN STOCK.
Illustrated Catalogues sent post free on application.

TANGYE BROTHERS AND HOLMAN,

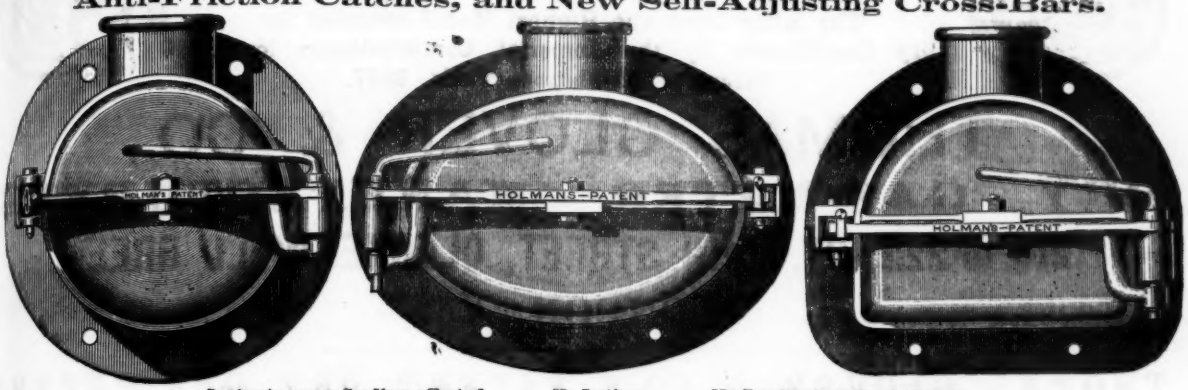
CORNWALL HOUSE, 35, VICTORIA ST., LONDON, E.C.

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1878.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

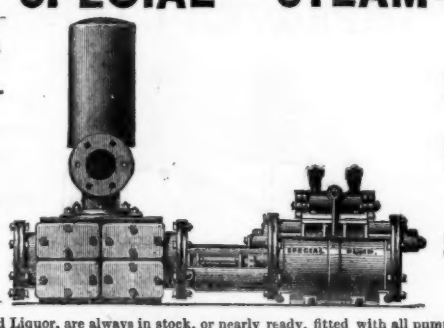
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

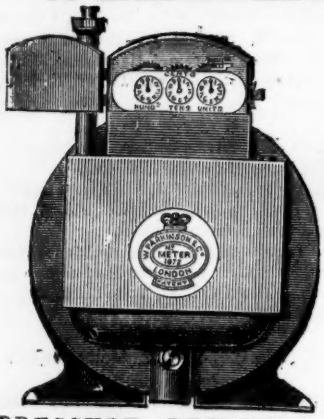
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



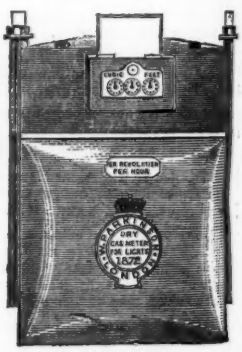
(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

STATION-METERS & GOVERNORS,

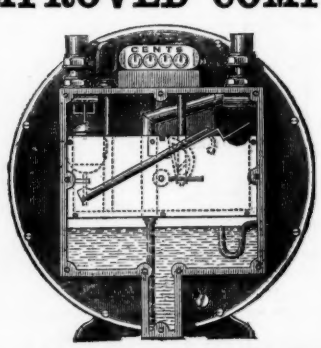
EXHAUSTER REGULATORS,



PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

E. G., Dunedin.—*Yours of the 12th of March received, and forwarded, as requested, to Mr. Fox.*

J. G. H., Wigan.—*Received.*

West of Scotland Association of Gas Managers.—*The report of proceedings at the last meeting reached us too late for insertion in present number.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 14, 1878.

Circular to Gas Companies.

The annual report of the Directors of the Paris Gas Company is always an interesting document, and we could almost wish to see its form and style imitated and copied by some of our leading Gas Companies, and Corporations who possess gas undertakings. It is true that any one who will take the trouble to study the accounts of English Companies in the form published by direction of the Board of Trade, can easily trace the development of the undertakings, and the extensions, which show the growth of the population and the progress of industry within their limits. The merit of the Paris Company's plan is, that a lucid connecting commentary brings out all the points on which observations are required. To start with, we are in this report informed that the consumption of gas during the past year did not show the increase which had taken place in what we may call previous normal years. It would seem that the effects of the War and the Commune have not yet completely disappeared from Paris; for the Directors express an expectation, that when the people return to their usual habits, a great rush will be made for a supply of gas. In order to provide for this anticipated demand, the Company are erecting new works on an extensive scale at Clichy. It is probable that, if European peace be preserved, the Exhibition will do much to calm the minds of the French people; and when that revival of industry, which we all so much desire to see, happens, the Paris Gas Company will largely share the benefits derived. It is noteworthy that the day consumption of gas in Paris continues to increase at a tolerably even rate, showing that gas is more and more used for culinary and other industrial purposes. The use of gas-engines continues to extend in Paris. Last year the Company sold forty-two such engines, and it is estimated that the total consumption of gas for the production of force in 1877 amounted to 31,664,000 cubic feet. It would be interesting to know to what extent such engines are employed in London, where gas is so much cheaper than in Paris. Another direction in which the use of gas is extending in Paris is for the illumination of flats, by the use of what are called *conduites montantes*, or pipes passing up the interior of a house, which the Company supply gratuitously. From these, service-pipes are carried into the apartments, also at the expense of the Company, who, further, we believe, let fittings on hire. The practice seems to be followed with great success in Paris, and we should be glad to see it introduced into some of our model lodging-houses, which are tenanted, for the most part, by respectable artizans, who would appreciate the use of gas.

During the year 1877 the Company carbonized coal costing £681,708; and the receipts for gas amounted to no less than £1,928,232. The residuals and manufactured products, &c., brought, £1,835,929, making the total revenue of the Company £2,764,151. Coke, as everywhere else, has been a drug in Paris, and the Company seem to have large stocks accumulated. Other residuals have also diminished in value; but, notwithstanding this, the Company make a large profit on their manufactured products. With such results, the Directors are, of course, able to pay the usual dividend, and carry forward a small balance.

The experiment with the electric light made yesterday week in front of the Mansion House and Royal Exchange can hardly be taken as a fair sample of the illumination which may be produced with this light. Two lamps were used, facing each other, one on the balcony of the Mansion House and the other placed in the *façade* of the Royal Exchange. The peculiarity of the invention which was exhibited lies in the construction of the lamp, in which the carbon points are placed in front of a semi-hexagonal reflector. The face of the lamp consists of a flattened convex opal glass, which hides the dazzling points of the carbon, and distributes the light in an equable manner. The effect, we are bound to say, was, so far, very good, and it may be that this form of lantern will prove serviceable in other combinations. The light of each lamp, yesterday week, was produced by the use of forty Bunsen cells, and, when modified by the opal glass, exhibited no particular intensity. Of course, we have to read that every gas-flame was paled before the dazzling luminosity, but we observed nothing of the sort. Every gas-jet looked as bright as ever. We studied their appearance in every possible way, and dare to affirm that nothing like what some of our contemporaries report took place, and that without gas the space between the two lights would have been very insufficiently illuminated; indeed, if lamps such as these were used to light up the space, at least five would be required. Five lamps, alimented each by forty Bunsen cells, could not be economical, and gas has nothing to fear from this last invention of the enemy. It is said that six of them would be sufficient to illuminate the whole length of London Bridge, and we shall not dispute the opinion; all we want to know is how the lamps are to be fed with electricity, and by what arrangement the carbon points are to be changed. The inventor of this lamp has not, so far as we know, discovered any means of subdividing an electric current, and to illuminate London Bridge by means of Bunsen's cells would be an impossible task. It is but fair to remark that the lights exhibited on last Monday week burned with fair steadiness. There was an occasional flickering, but little more. It must be added, however, that they were not kept burning sufficiently long for any alteration of the carbon points to be required. We may express a favourable opinion of the lamp exhibited, but with no fear that it will lessen the use of gas.

The Medical Officer of Chelsea still continues to complain of the low illuminating power of the London Company's gas. This, we now find, he ascribes to what he terms an excess of carbonic acid. If that be the fact, the Company have an easy remedy; but we have before pointed out that Dr. Barclay tests the gas with one burner and the Company test with another. By this latter (Sugg's New "London" Argand, No. 1) the gas is represented as of over fifteen-candle power, while the Sugg-Letheby used by Dr. Barclay makes it only as between twelve and thirteen candles. This, however, constitutes no grievance against the Company, who are only bound to supply twelve-candle gas. According to the showing of their own Medical Officer, the Chelsea Vestry have nothing to complain of.

The Sheffield Gas Company have resolved to issue new share capital, in order to pay off their remaining mortgage debt of £89,400. The new shares will be of the nominal value of £8 10s. each, and the dividend upon them will be subject to the sliding scale. So prosperous are the Company, however, that ten per cent. will, no doubt, be paid at once. Although some classes of the shares of the Company are subject to the sliding scale, happily there are no auction clauses in the special Act; consequently the Directors are able to allot the shares among existing holders. A comparison was made at the meeting, by one of the Shareholders, of the prices charged by Corporations and Companies for gas, in the course of which the Sheffield Company appeared to great advantage. There is now, we think, no fear that the Corporation of Sheffield will endeavour to obtain possession of the gas undertaking. The consumers are perfectly satisfied with the Company, and, while gas is supplied at a reasonable rate, will continue to be so.

It can hardly be said that the consumers of Birmingham are perfectly satisfied with the Corporation. Some of them inquire

why gas should be dearer in Birmingham than in neighbouring towns, which enjoy no greater facilities for getting coal or distributing gas. There seems to be much discontent amongst the smaller consumers, who have to pay the highest price. The differential rates of charge, according to consumption, appear to be fair in principle, but they sometimes press heavily on those least able to pay the highest charge, and, no doubt, to some extent, prevent the more general use of gas. We would recommend the Gas Committee of the Corporation of Birmingham to reconsider the matter, and see if some relief cannot be given to the poor and small consumers.

The Corporation of Swansea have been measuring the quantity of gas consumed in some of their public lights. They have found, as a matter of course, that it is sometimes below and sometimes in excess of the quantity contracted for. The average amount consumed, however, in the lamps experimented upon was found to be somewhat in excess of that stipulated. We believe the Company's Manager, in his experiments, found the gas actually consumed per hour considerably above that given by the Corporation's Examiner. If we did not know that nothing the Gas Company could do would satisfy a section of the Corporation of Swansea, we should recommend them to adopt the average meter system at once. To this course, however, they are strongly adverse, and probably because they know it would remove all grounds of complaint against the Company. Alderman Jenkins would soon die of vexation if he had no opportunity of abusing the Gas Company; and for the same reason the *Cambrian* would, at times, find itself short of matter to fill its columns.

We have referred once or twice to a new process which is to produce gas for nothing, and by its sale give a profit of 150 per cent. We have before us a description of the invention given by, we presume, an admiring disciple, who is free to write, now that the inventor has secured patents for all quarters of the globe. Briefly speaking, the invention is this (we should say as described by a contemporary):—A boiler is placed above a retort, both being above a furnace, and flues being carried from the furnace around each. The boiler is to be filled with sewage or water. At the back of the retort are placed discs of iron, perforated in all directions, and, beyond this, closely packed limestone. Now comes the difficulty, for the inventor at starting makes no provision for fuel. We will suppose, however, that a coke fire is lighted in the furnace, that the retort is heated to redness, and that the sewage begins to boil. The steam from this passes to the back of the retort, and through the perforated iron plates, by which means the steam is decomposed, the oxygen uniting with the iron, and the hydrogen passing on. "Hydrogen," says the inventor, "burns with a pale blue flame, but immediately "after leaving the iron discs, it comes in contact with the lime-"stone, where it takes up carbonic acid," and so says the writer we quote from, "becomes lightly carburetted." So far the gas has acquired but little luminiferous power, for after passing through the limestone the mixed gases burn with a pale red flame. But now comes the part that sewage is to play in the business. It having been boiled to dryness, the solid residue is taken from the boiler and placed in the front of the retort, where, we are told, a large quantity of carbon is disengaged, which, combining with the "lightly carburetted hydrogen," forms a mixture which, when burned, gives off a great amount of light. We do not wish to do the inventor the slightest injustice, and therefore give this description as we find it. There are grosser absurdities in the description we quote from, but we shall not refer to them, unless we find them in the patentee's specification, which will shortly be published.

We are requested to make a statement, which, on our own parts, we should not have considered it necessary to make, that Mr. F. J. Evans, one of the Directors of The Gaslight and Coke Company, who is associated with Mr. Sugg in an invention which we described last week, has no pecuniary interest whatever in the patent, so far as his own Company are concerned, and, indeed, that he is not likely to derive any profit from it at all. It, and the associated invention, will be offered to all Companies in consideration of a payment of a small royalty, merely intended to cover the expenses which have been incurred.

Water and Sanitary Notes.

At the meeting of the Metropolitan Board of Works, last Friday, it was resolved to withdraw the two Water Bills. And, accordingly, last night Sir J. M. Hogg moved in the House of Commons that the Order of the Day for the second reading of the Purchase Bill be discharged, and announced his intention of withdrawing the Supply Bill. The report and resolution brought up by the Committee of the Board gave rise to an interesting discussion, which will be found reported in another column. It must have been clear to every one, even to Sir J. M. Hogg, that from the very first the Bills had but little chance of becoming law; and when the Home Secretary announced that the Government would give the Board no assistance, all hope must have vanished. We have a strong opinion that there are but few members of the Board who really wished the Bills to pass this session. We would prefer to see the question well ventilated, and the public mind stirred on the matter; but, as one Member almost pathetically remarked, the general public are utterly indifferent. The Vestries and District Boards—even those who gave the strongest support to the Board—lent but lukewarm assistance, and then only so far as regarded the Purchase Bill. The supply scheme was never supported by any section of the community, except a few *doctrinaire* sanitarians and engineers.

The Bills being withdrawn, there is, we fancy, an end of them for ever. The Metropolitan Board are not likely again to try to purchase the Gas and Water Companies. These Companies will be left in possession of their property for a long time to come; but they may be incessantly harassed by the promotion of measures designed to limit their powers and curtail their privileges. Against such there is no protection. The recklessness of the Metropolitan Board in squandering the ratepayers money in parliamentary proceedings and engineering adventures, has become proverbial. It was stated at the last meeting that the cost already incurred this year on account of the Water Bills will amount to at least £12,000. If the Purchase Bill had gone before a Select Committee, as much more would probably have been spent, and all for nothing. It may be taken as certain that no Committee would have passed the preamble of the Bill; but after a month's inquiry, carried on at perhaps a cost of £1000 a day, the opposing parties would have been left in exactly the same positions. It was extraordinary to hear some Members of the Board argue, that, inasmuch as so large a sum of money had been already spent, it would be well to keep the Bills on the paper of the House of Commons, with a chance that Government and the friends of the Water Companies might one evening be caught napping, and the second reading of the Purchase Bill be carried by a sort of fluke. It would have been an unfortunate circumstance if such a thing had occurred, and the Members did well to reject the mischievous advice offered to them. It could only have led to greater expense, and of this we have had more than enough. A time, we are satisfied, will come when that much-enduring individual, the Metropolitan Ratepayer, will discover how his money is wasted. There is our friend, Mr. Leslie, endeavouring to show that the Board borrow two millions and a half of money at, say, three and a half per cent., and then deposit it at two or two and a half per cent.; thus losing at least one per cent., which must be drawn from the ratepayers pockets. This is an odd sort of financing; but they do strange things at Spring Gardens. The officials took a cheque a short time ago for £90 7s. 6d.—in payment of some fees for testing gas-meters, we believe—but it was not cleared immediately, and in a few days the bank on which the cheque was drawn failed. We shall not pretend to decide on whom the loss will fall, whether on the meter maker or the ratepayers. It is a very small matter, and we do not suppose the Board will be much exercised over it.

The Thirlmere Defence Association have published a report, narrating the progress of the Manchester Corporation Water Bill through the House of Commons, and repeating their statements that Manchester could have got water much nearer home than Thirlmere. They indulge again, too, in the silly nonsense about spoiling the beauties of lake scenery by putting a lake to a useful purpose. Then comes, perhaps, the point; they want money to carry on their opposition in the House of Lords, and ask for £2000 for the purpose.

A deputation from the Gas and Water Committee of the Corporation of London went to Manchester and Liverpool last week, to inquire into the constitution of the Fire Brigades in these cities, and to see the use of hydrants. We rather think they arrived in Manchester a day too late; for on Monday morning there was a large fire in that city, and, as usual, when a fire gets full hold of premises, they are burned to the ground, brigade men and hydrants notwithstanding. In this case it is alleged that there was a great deficiency of water, and consequent want of pressure; but it must be known that the property destroyed was situated in a very low neighbourhood, and only supplied with water for potable and other domestic purposes. It seems, then, that the Corporation of Manchester are not altogether so successful in the management of their water undertaking as some would have us believe. Nothing worse could be said of a Metropolitan Water Company than that there was a deficiency of water in the case of a fire, even in a Whitechapel slum.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CLXV.

PUBLIC LIGHTING (*continued*).

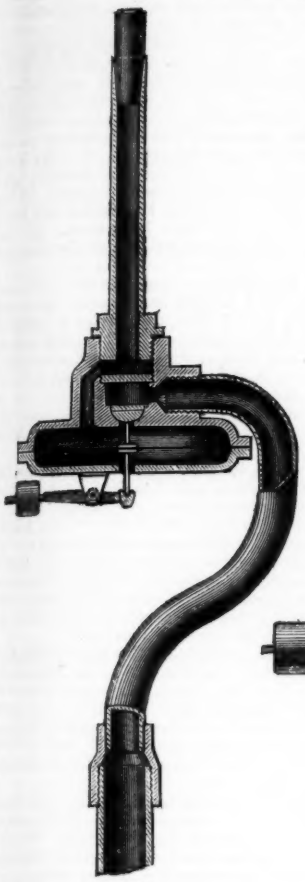


FIG. 48.

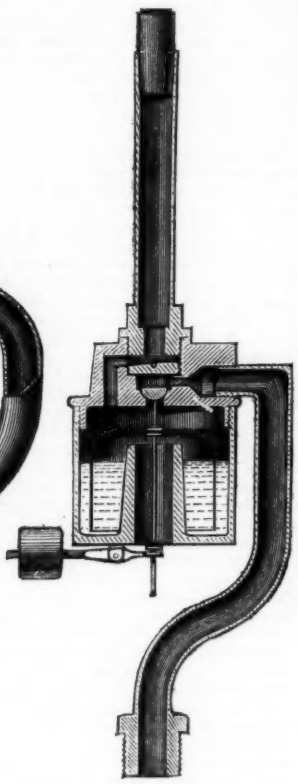


FIG. 49.

In the last chapter we described Mr. Foulis's automatic lamp-lighter; and we now give illustrations (figs. 48 and 49) of the same arrangement applied as a dry or wet governor, without the self-lighting apparatus. In this instance the air-pipe is dispensed with, and, instead, the bell is counterbalanced by a weight, by screwing which out or in, the pressure at the burner is altered as required. Both of these descriptions of governors are in successful operation.

The automatic lighting apparatus of Messrs. Flürscheim and Baumeister has been recently so well described in these columns, by Mr. A. F. Wilson, that nothing beyond calling attention to the paper* exemplifying its action and utility need be said with reference to it here.

Ignition by the agency of electricity has been tried in different ways with varying success. One method of application is the arrangement above the burner of metallic points, approaching, but not coming in contact with each other, ignition being effected by means of the electric spark generated from an "intensity" battery. Another is that of sending a current of "quantity" electricity through an insulated copper wire leading to the burner from both poles of a voltaic battery, the ends of the copper wire being joined by a short piece of fine platinum wire, fixed permanently over the top of the burner. On the current being sent through the conductor, the platinum wire is heated sufficiently to ignite the gas issuing from the jet. The stopcock is opened and closed by an electro-magnet fixed near to it, and connected to the battery used for lighting.

The difficulties of maintaining an unbroken circuit through a long length of wire have hitherto proved insurmountable, principally from the liability of the heated wire to fuse, from the varying power in the discharge from the battery. To this is superadded the heat of the gas-flame acting upon the permanently fixed wire across it, or from slight irregularities in the thickness of the wire itself.

An exception must, however, be made in favour of the invention of Mr. Lane Fox, described in the present volume;† the arrangement is as simple as it is ingenious and beautiful, and the tests to which it has been subjected augur well for its ultimate success.

In concluding the subject of automatic lighting, it will be appropriate here to quote a description of the method adopted for igniting, by means of the induction spark, the jets in the Royal Albert Hall, which is the largest building to which electricity has been applied in gas lighting. The arrangement employed was designed and carried out by Mr. Ladd, and in a paper read by Mr. W. Lloyd Wise before the Society of Arts, on March 5, 1873, the details of the system are thus explained:—

"The lights are arranged in 30 clusters of five stars each, each star containing 21 jets or burners. A bichromate battery is made to work an inductorium or induction coil, connected to which is a semicircular insulated arrangement. Attached to this are 30 wires, which lead off one to each of the 30 clusters.

"The burners are arranged in sets of three, somewhat like a three-pronged fork, and the ends of a couple of platinum wires, connected with the battery, are fixed within a short distance of each other, near the orifice of the centre burner of one set in each star, there being a special conducting wire from the battery to one of the stars in each cluster, or 30 wires in all. When the galvanic circuit is closed, by lowering the plates of the battery into the acid, a spark is caused to pass from the point of one platinum wire to the other, and thereby ignite the gas issuing from the burner. Since that burner is within lighting range of its neighbours at each side, they, in turn, with those next to them, and so on, the ignition of the gas proceeds from one to the other all round the star. The platinum wires are held by iron wires, attached by a small block of steatite to the stem of the burner, and are placed slightly below the horizontal line of the burner orifice, so that when the gas is alight, the upward draught draws the flame away, and so prevents deposit of carbon upon them. The gas is turned on and off by stopcocks in the mains in the ordinary way."

The conditions of lighting a building, such as that referred to, are, of course, widely different to those which obtain in the street-lamps. The supply of gas to the burners in the former case is controlled by one or two stopcocks, which are operated by hand, so that the system described is inapplicable to lighting the street-lamps, the automatic opening and closing of the gas passage in which is one of the principal difficulties to be surmounted.

It would be impossible, in the limited space at our disposal, to describe all the various contrivances for automatic lighting that have been patented from time to time. We have endeavoured to select those that are typical of the different plans that have been tried. They are, as a rule, remarkable for their ingenuity, but most of them have failed in practically meeting the every-day requirements of the work proposed to be accomplished by them. The problem, simple as it appears at first sight, is, without doubt, a difficult one to solve, and will further tax the ingenuity of inventors. Any plan, to succeed, must combine the essentials of simplicity with certainty of action, and for universal application it must be readily adaptable to meet varying circumstances.

* See Vol. XXX., p. 18. † See *ante*, p. 18.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

GAS-WORKS CLAUSES ACT AMENDMENT ACT, 1871.

SIR,—The decision of the Court of Queen's Bench, in the case of the *Commercial Gas Company v. Scott*, respecting the Gas-Works Clauses Act Amendment Act, 1871, which was to the effect that the Act of 1871 applied to all Companies subject to the Act of 1847, irrespective of its being incorporated in any of their special Acts, has from time to time caused much trouble to Provincial Companies, and I have frequently been asked whether the Companies are subject to that Act without its being incorporated, as in all other similar cases in their special Acts or not.

The practice of Parliament in these cases may be simply described as follows:—

When application is made for a special Act, the Act is granted on the condition that the last general public regulations relating to the subject are made part of the special Act, and if at any future time an application is made for further powers, and other regulations have been made in the meantime, then that those other regulations are made part of the further Act; but, unless such further Act is applied for, the original regulations are never interfered with.

When Parliament has granted certain powers by means of a special Act for a given purpose, it has always declined to revoke or interfere with those powers, except at the instance of the parties to whom they were granted.

It has often been said that the Metropolis Gas Act, 1860, is an instance against this view, but it is not so. On the contrary, it is a very striking instance in support of it, which I will explain further on.

Within my knowledge there is no precedent for, and nothing to uphold, the decision in this case. The utmost that can be said in support of it is that the Act may be construed to apply in all cases of special Acts passed subsequent to 1871 without being incorporated, as all persons applying for special Acts subsequent to that date must have been aware of what the requirements were; but there is nothing to support the doctrine that it applies in other respects. I have, therefore, always said, in reply to these applications, that I have a very decided opinion that the decision in this case is founded on an entire misapprehension of the facts, and that, if the question were tried again on some other point this judgment would most surely be reversed; that I should disregard it, and go on in my old way, leaving it for those who felt themselves aggrieved to take action upon it to set themselves right.

There is, however, at the present time, a Bill pending in the House of Lords to consolidate, with amendments, the Acts of 1847 and 1871, and, as the insertion of a few words in that Act might remove all doubt upon the subject for the future, I have, with a view to further proceedings in that direction, recently gone into the case more fully than I have ever done before, and I am now more than ever convinced that the decision of the Court of Queen's Bench was, as I said before, founded on an entire misapprehension of the facts.

As the matter is important, and the Companies may have to take some action in it themselves very shortly, I trust you will allow me to state in your columns how the case presents itself to me.

The case may be thus shortly described: The Commercial Gas Company, one of the Companies supplying the Metropolis, and subject to

the Gas-Works Clauses Act, 1847, as amended by the Metropolis Gas Act, 1860, but not subject to the Act of 1871, as they contended, that Act not being incorporated in any of their special Acts, for some reason or other cut off the supply from one of their consumers, and refused to reconnect it.

The consumer thereupon summoned the Company before a London Magistrate under the Act of 1871. The Company contended that they were not subject to that Act, but the Magistrate held a different opinion, and convicted them in a penalty of £10—the Act prescribing a penalty of £2 per day. The Company thereupon appealed to the Court of Queen's Bench against the conviction, but the Court held that the conviction was right.

The case is reported in the Queen's Bench Reports, Vol. X., p. 100, but the report is not a very lucid one; nevertheless, as it is the recognized official report, we must deal with it as correct. But, to make it intelligible to non-professional readers, it will be necessary to quote it at some length.

The following is an epitome of the report and decision:—

"Lush, J.—Sect. 1 of the Act of 1871 says the Gas-Works Clauses Act, 1847, and this Act shall be construed as one Act, and the provisions of this Act are to supersede such of the provisions of the Act of 1847 as are inconsistent with them. *Surely, by that the Act of* 1847 *stands amended, not only in the statute-book, but in every private Act in which it has been incorporated.*

"Quain, J.—Sect. 1 of the Act of 1871 amends the Act of 1847, as incorporated with other Acts, and Sect. 3 makes the two Acts apply to all future Companies, without any incorporation being necessary.—Sect. 3 being as follows: 'The provisions of this Act shall apply to any gas undertaking authorized by any special Act hereafter passed, or by any Provisional Order made under the authority of the Gas and Water Facilities Act, 1870, *save when the said provisions are expressly varied or excepted by any such special Act or Provisional Order.*'

"Lush, J.—I am of opinion that this conviction is right. The Act of 1847 was a model Act, which was to be applied to all Companies and all gas-works authorized by any Act of Parliament which shall declare that the Act shall be incorporated therewith. Then came the Act of 1852 to establish this Company, which had a clause incorporating the Act of 1847. Then, in 1860, there came the general Act 23 & 24 Vict., cap. 125—an Act for better regulating the supply of gas to the Metropolis, called the Metropolis Gas Act, and that Act recited all the London Companies, of which the Commercial Company is one. And Sect. 2 of that Act says: 'The Gas-Works Clauses Act, 1847 (except so far as the provisions thereof are inconsistent with this Act), is incorporated with and forms part of this Act, and shall apply to the several Companies before named or referred to as fully as if the gas-works of the several Companies were authorized by this Act.' Therefore from that time the Act of 1847, as amended by the Act of 1860, was directly applied to all the Gas Companies of the Metropolis, and consequently the operation of the Act of 1847 upon those Companies did not depend upon the incorporating clause of the private Act, but upon the general enactment in Sect. 2 of the Act of 1860, which had the same effect as if there had been no [probably intended for 'an'] incorporating clause in the private Act. Then came the Act of 1871 (34 & 35 Vict., cap. 41), which is another model Act, not an Act solely for the particular Companies like the Act of 1860, but a model Act for application *to any Gas Company incorporated under an Act of Parliament.* Sect. 1 of this Act says: 'The Gas-Works Clauses Act, 1847, and this Act, shall be construed together as one Act, and the provisions of this Act shall be held to repeal and supersede such of the provisions of that Act as are inconsistent with this Act.' That of necessity, therefore, takes in the Act of 1860, because that took in the Act of 1847, and said the Act of 1847 and the Act of 1860 should be read as one Act. *I cannot, therefore, entertain the slightest doubt that every provision in the Act of* 1871 *governs all the London Gas Companies.* Indeed, it would be an extraordinary thing if it were not so, because that Act was passed to secure a great benefit to the public and *advantages to Gas Companies;* and, amongst others, it appointed Public Examiners, by whom the illuminating power of gas should be tested from time to time, and other regulations. It would be an alarming thing to the inhabitants of the Metropolis to find that not one of those provisions—for that would be the consequence if Mr. Williams's argument were to hold good—would be applicable to any part of the Metropolis."

It is evident from this that the Court gave its judgment under the impression that, by imposing the Act of 1871 upon the Metropolitan Companies, instead of the Act of 1860, it was protecting the interests of the Metropolis.

The Court said the Act of 1871 contains provisions for the appointment of Examiners for testing the illuminating power of the gas, and other regulations, and it would be an alarming thing to the inhabitants of the Metropolis if they were to find themselves deprived of these advantages.

Whereas the fact is that the Act of 1860 had conferred all these advantages, and many more equally beneficial, upon the Metropolis, many years before, and the Act of 1871 was merely a modification of the Act of 1860, designed to confer some of the advantages of that Act—but not all—upon other places.

The Court, therefore, in throwing the Act of 1860 overboard, and putting that of 1871 in its place, was taking away from the Metropolis that which was in the highest degree beneficial to it, and giving it something else in return that was comparatively of no value at all.

The judgment, therefore, instead of being a protection to the inhabitants of the Metropolis, as the judges intended and expected it would be, was precisely the reverse.

The judge quotes clause 1 of the Act of 1871, which enacts that the provisions of that Act shall supersede those of 1847, and then says that as the Metropolis Gas Act, 1860, had previously, to some extent, superseded the Act of 1847, so also the Act of 1871 had superseded the Act of 1860; but besides the Act of 1860, there was another Act passed in 1868, called the City of London Gas Act, which repealed, as respects the City, certain parts of the Act of 1860, and made other provisions in lieu thereof. This Act was not referred to in the case, as the matter did not affect the City; but if the decision is good as respects the Act of 1860, it is also good as respects the Act of 1868, and both Acts are repealed; but, as a matter of fact, the judgment is a mistake, and the Acts are not interfered with.

The Act of 1847 is a consolidation Act, and the Act of 1871 is the same; consequently, in all cases where the Acts apply, the last, as a matter of course and without any express provision to that effect, either repeals or amends the first. Of that there is no doubt; but both Acts say that the provisions thereof shall apply, not absolutely, as the judgment declares, but "*save where the provisions shall be expressly varied or excepted by the special Acts.*"

The judgment, in saying that the Act of 1871 supersedes the Act of 1860, assumes that the Act of 1860 is a consolidation Act, but it is not so; on the contrary, it is a special Act, and says: "Clause 3. This Act applies to the several Gas Companies, and to all persons already or hereafter supplying gas within the Metropolis;" and, consequently, the Act of 1871, even if the Companies were subject to it, would not repeal or interfere with the Act of 1860.

When the Metropolis Gas Act of 1860 was first proposed, there were 13 Companies in the Metropolis. If, therefore, the regulations of that Act—which the Companies had agreed to before the introduction of the Bill—had been imposed upon each Company separately, there would have been 13 separate Acts, which would have caused both delay and expense; and so, to avoid this, it was agreed to substitute one Act applicable to all the Companies, and proceed with it as a public Act, under the title of "The Metropolis Gas Act;" but it is none the less a special Act for the Metropolis, to all intents and purposes. Its very title implies that it is so, just the same as the Manchester Gas Act, or the Birmingham Gas Act, or that of any other large town. The City of London Gas Act was passed under precisely the same circumstances, only in a lesser degree.

Under the Act of 1860, the Metropolitan Companies are required to furnish a supply of gas, and lay down, at their own expense, all services within 150 feet; but under the Act of 1871, Companies are required to supply gas, and lay down 30 feet of service only. The Court, in giving its decision, noticed this; but said that, as the Act provided no remedy in case the Companies did not do it, they could only be sued, it was, no doubt, intended to be so; but this is another misapprehension, as the penalty and mode of recovery are precisely the same in both Acts—viz.: "A sum not exceeding forty shillings for every day" during which the supply is withheld.

If this had been my case, I would, immediately after the decision had been given, have got up another case, reversed the positions, and tried the question over again upon some other issue.

I would have assumed that the judgment was correct; that the Act of 1860 had been repealed; and that the Company were subject to the Act of 1871; and, then, in some case where there was a long service, have made a charge for all the distance beyond 30 feet. This would have led to a summons from a Magistrate, when I would have pleaded the former decision; and if this point was decided against me, have gone again to the Queen's Bench with the same defence.

I have shown the effect of the decision on the Metropolitan Companies, because the case occurred in the Metropolis; but it is only for the Provincial Companies that I am concerned. The report leads to the inference that the Court held, that, as public Acts came into operation immediately they were passed, and repealed, or amended, all former Acts relating to the same matter, and the Acts of 1847, 1860, and 1871 were public Acts, so the Act of 1847 was amended by that of 1860, and the Act of 1860 by the Act of 1871.

It is this kind of reasoning, no doubt, that has led to this very unsatisfactory judgment, for nothing could be more delusive. Public Acts are not all alike, and cannot be dealt with on the same footing. Many Acts are passed as public Acts which relate solely to private undertakings, and which are in their character unquestionably special Acts.

Under the title of public Acts there are—

1. Acts relating to the general public law, in which we are all interested alike.

2. Acts to confirm Provisional Orders granted by the Board of Trade, and the Local Government Board, for the construction of gas-works water-works, piers, harbours, tramways, &c.

3. Acts (consolidation) to regulate the constitution of companies, the purchasing of lands, the management of Railway Companies, Gas Companies, Water Companies, &c.

4. Acts relating to special subjects, providing for certain things and in certain events.

All these are public Acts, but they do not all operate, and cannot all be dealt with, in the same way; it is only the first class—those which affect the public interests generally—that can, strictly speaking, be called public Acts. With these it is, no doubt, the fact that each in its turn supersedes or amends the preceding Acts relating to the same subject.

But this rule does not apply to the other Acts, in which the public, as a body, are not interested. The Consolidation Acts, in particular, stand on an entirely different footing; they are not, it may be said, laws in themselves, but merely advertisements—notices to the public that, if they require from Parliament any special powers, they must comply with the regulations prescribed in those Acts, as no such powers can be granted without them. When they are incorporated in special Acts, they become law, but not otherwise, and even then only as and because they form part of the special Act. It never was, and it is quite impossible to suppose that it ever could have been, the intention of Parliament, in passing those Acts, to impose them bodily upon all parties to whom they relate, immediately they were passed, whether the parties were willing to adopt them or not. On the contrary, the intention of Parliament was simply to forewarn the public that in seeking for any special powers, they must be prepared to adopt the general regulations applicable thereto, as embodied in these Acts.

The provisions of the Acts themselves are not inconsistent, but, on the contrary, confirm this view. All the original Acts say that they shall apply *only* when incorporated with any special Act thereafter passed. Some of the amending Acts omit the words, "incorporated with," but this does not impair the provision. The objects and purport of the Acts are governed by the originals, the amending Acts are merely matters of detail.

The authorities of the two Houses of Parliament always require the amending Acts to be incorporated in every special Act passed subsequently, whether there is a provision in the Act to that effect or not. We may, therefore, infer that they do not suppose that they apply without incorporation; and the Board of Trade in all their Provisional Orders do the same.

The Board of Trade were the promoters of the Act of 1871, and in all their Provisional Orders passed subsequently, except such as relate to

capital only, the Act is incorporated; it may, therefore, be safely inferred that it was not their intention that the Act should, nor their belief that the Act does, apply without incorporation.

The Court, in order to bring the Companies under the Act of 1871, seem to have relied chiefly on Clauses 1 and 3, which are as follows, viz.:—

"Clause 1.—The Gas-Works Clauses Act, 1847, and this Act shall be construed together as one Act, and the provision of this Act shall be held to repeal and supersede such of the provisions of that Act as are inconsistent with this Act.

"Clause 3.—The provisions of this Act shall apply to any gas undertaking authorized by any special Act hereafter passed, or by any Provisional Order made under the authority of the Gas and Water Works Facilities Act, 1870, *save where the said provisions are expressly varied or excepted by any such special Act or Provisional Order.*"

Clause 1 of the Act of 1871 says the Acts of 1847 and 1871 are to be read as one Act, and that the provisions of 1871 are to repeal such of the provisions of 1847 as are inconsistent therewith. Consequently, such of the provisions of 1847 as are not inconsistent with 1871 remain, and are operative still.

Clause 1 of the Act of 1847 says: "This Act shall extend *only* to such gas-works as shall be incorporated by any Act of Parliament *hereafter to be passed* which shall declare that this Act shall be incorporated therewith."

There is nothing in this last provision which can in the slightest degree be construed to be inconsistent with the Act of 1871; consequently, it governs the whole matter. As it stood in the original Act, so it stands in the amended Act—that is to say, as the original Act was *only* to apply when incorporated, so the amended Act is *only* to apply in the same way.

The Acts of 1847 and 1871 are in future to be read together as one amended Act. The Act of 1847, as originally drawn, is, therefore, to remain in force, wherever it is incorporated, until in some other Act, *hereafter to be passed*, the amended Act shall be incorporated, and thenceforth—and *only* thenceforth—the Act, as amended, is to be in force.

The Act of 1871, even taken by itself, is not inconsistent with this view; but, on the contrary, confirms it.

Clause 1 says the two Acts shall henceforth be read together as one Act; and clause 3 says this Act—that is, the Act as amended—shall apply to every gas undertaking authorized by any special Act or Provisional Order hereafter passed.

Notwithstanding all this, the two Justices who heard this appeal, each speaking for himself, decided as follows:—

"Lush.—That the Act applied at once, immediately it was passed, and, consequently, before it was possible to incorporate it, to all Companies subject to the Act of 1847.

"Quain.—That the two Acts applied to all future Companies, without any incorporation being necessary."

To understand the effect of the last observation, it must be borne in mind that the two Acts are to be construed together as one Act. It will not be possible to incorporate 1871 without 1847, or 1847 without 1871; consequently, the Act of 1847, as amended by the Act of 1871, is to apply to all future Companies, without any incorporation being necessary. Can any one say what the meaning of this is?

It is difficult, at best, to get any precise meaning of the words, "that the Act shall apply to all future Companies;" but when the Court itself has decided that the Act, without any special provision to that effect, applies to a Company incorporated 25 years ago, it seems useless to attempt it.

Since this judgment was given, counsel's opinion as to whether the Act does apply or not has been taken on two or three different occasions, and on each occasion the opinion given (so far as I have heard it) has been in favour of the views of the Court; but when a case has been decided, appealed against, and confirmed, it can hardly be expected that counsel will give an opinion against the Court, as they must, to some extent, be governed by the Courts.

I have carefully considered this matter in all its bearings, so far as they have occurred to me, and I have endeavoured to do so impartially; but I still entertain, as I stated before, a very decided opinion that the decision was given under a misapprehension of the facts on all points, and that it is, consequently, wrong in every possible way.

Referring again to the Metropolis Gas Act, the explanation I promised to give respecting it is this: A few years before that Act was passed the London Companies had been fiercely competing with each other in all the chief parts of the Metropolis—two and sometimes three Companies in the same street. This had been carried to a state of complete exhaustion by some of the Companies, and almost so by others, when they agreed among themselves to take separate districts, and not interfere with each other, and thereupon they made an exchange of customers, which caused great dissatisfaction, and led to a parliamentary inquiry.

One session was occupied in this inquiry—the Companies contending, on the one hand, that they were not obliged to supply gas to any one, that they could do so or not as they thought fit, and that what they had done was quite within their powers; their opponents contending, on the other hand, that although the Companies were not bound to give a supply, still, having given one, and entered into contracts with their consumers to do so, they had no right to break through those contracts, refuse to continue the supply, and transfer the consumers to other Companies.

This was a novel doctrine at the time, although it would be accepted as a matter of course now. The Companies, however, seeing the difficulty that they would be placed in if this point was driven home and given against them, entered into negotiations with their opponents, and this resulted in an arrangement by which all the Companies agreed to submit to certain general regulations, upon the condition that their districting arrangements were sanctioned.

A Bill was thereupon prepared embodying these regulations, with some others which both parties agreed should be left for the decision of Parliament.

The Companies, therefore, were themselves the promoters of the Bill with some of the London parishes.

The Bill was referred to a Select Committee to settle the disputed points; these were decided, some in favour of, and some against, the Companies—the Companies accepting the decisions, and continuing their position as promoters until the question of dividend came up, when the Committee proposed to reduce the maximum from 10 to 8 per cent. This the Companies declined to accept, and withdrew. The Committee then finished their labours in the absence of the Companies, and reported the Bill to the House.

The Companies appealed to the House against this arbitrary interference with their parliamentary powers without their consent, and the House sent the Bill back to the Committee.

The Companies then appeared before the Committee a second time, when the 8 per cent. was struck out of the Bill and 10 per cent. reinstated, and then the Companies carried it on to the conclusion.

When the Bill reached the Lords some of the parishes that had been joint promoters in the Commons wished to oppose, but this the Lords would not allow.

The Companies were throughout the whole of the proceedings (except at the time when they withdrew) the joint promoters of the Bill, and without their consent it never would have passed.

This is not, therefore, a case of interference with prescriptive rights without consent, but rather a strong illustration of the other view.

W. Livesey.

Gas and Water Companies Association, 5, Victoria Street, Westminster, May 11, 1878.

HOW NOT TO DO IT.

Sir,—I will answer the communications which have appeared in the Journal on this question next week. Having occupied so much space on another subject, I am afraid to trespass further in the present number.

W. Livesey.

WATER GAS.

Sir,—In the "Circular to Gas Companies," in your last issue, reference is made to a report by Professor Würtz, on the water gas made and supplied by the Municipal Gas Company, New York. Permit me to mention that the process used by the said Company is not "what is known in New York and other cities of the United States as the Lowe system of gas-making;" it is rather what should now be called the Kirkham-Rowland process—to my mind, a very superior method.

I am sure you will only be too glad to correct the statement when I inform you that what is now being done is simply the outcome of improvements made by Mr. T. F. Rowland, of the Continental Works, Brooklyn, on the process invented by Messrs. John and T. N. Kirkham, and secured by patents in 1852 and 1854. In short, it is the Kirkham process brought into practical use on a large scale by Mr. Rowland.

As I happen to know something of the history and practice of the affair, I will supply you with it, if you think it worth while.

May 8, 1878. W. Mann.

[Our correspondent will find, on referring again to the "Circular" of last week, that although the system of water gas manufacture at the New York Municipal Works is referred to, it is not mentioned as the Lowe system. We shall be glad to hear from our Correspondent any particulars of the system alluded to in his letter.—Ed. J. G. L.]

MESSRS. EVANS AND SUGG'S PATENT.

Sir,—In the last number of your Journal, you noticed a patent, for dealing with the sulphur compounds, by Messrs. Evans and Sugg. If you will refer, Mr. Editor, to Hills's patent for heating gas liquor, you will find that the whole value of this invention has been anticipated by Hills. It is true that Hills does not make a pure caustic ammonia, but he makes it sufficiently pure for the purpose—that is, to remove the sulphur compounds other than sulphuretted hydrogen. Besides, Hills's patent will do it at much less cost than Messrs. Evans and Sugg's. In Hills's, the whole of the carbonic acid is allowed to escape into the air, thus saving the whole of the lime, while in Messrs. Evans and Sugg's, lime has to be used. It may be urged that Hills does not make the liquor sufficiently strong; but a patent has been taken out by Messrs. Collinge and Paterson, by which, with a slight alteration of Hills's apparatus, the concentration of the liquor could be effected to any strength desired. I may say, from experiments I made some time ago, that the "sulphur other than sulphuretted hydrogen" may be brought down to as low as 5 grains per 100 cubic feet of gas by an excess of free ammonia in the gas, which must afterwards be washed out.

Chemicus.

THE TEMPERATURE OF GAS IN ASCENSION-PIPES.

Sir,—In the May number of the "Treatise," Part 4, Chap. I., in the article on "Condensation," a quotation is given from Clegg (4th edition, p. 174), to the effect that the gases and vapours generated in a retort heated to, say, 1800° Fahr., if allowed free egress, are found to have the temperature of only 120° to 130°.

I am afraid this matter has not received the attention it deserves; and, without for a moment reflecting upon the well-known talent and ability of my esteemed friend, the Editor of the "Treatise," I shall, with your kind permission, and in the interests of our profession and of science, give you the results of some experiments I made some time ago on the temperature of the gases evolved from a small experimental retort.

The retort was of cast iron, D-shaped, 5 inches wide on the bottom, and 5 inches high. In the first experiment a thermometer was inserted in the side of the ascension-pipe, about 3 inches above the mouthpiece, having the bulb across the axis of the pipe, which was 1¼ inch in diameter. An ordinary working heat having been obtained, a charge of 2¼ lbs. of coal was put in, and the retort sealed with a luted lid in the ordinary way. The temperature of the evolved gases was immediately observed; but before any reading could be made, the thermometer had to be quickly withdrawn to prevent accident, the temperature having risen from about 80°—at which the mercury stood before the retort was charged—to no less than 640°; and had the thermometer not been removed, it would, as I afterwards discovered, have been broken, as the temperature was higher than the boiling-point of mercury.

This was, to me, an unexpected and startling discovery, and one

which I am not aware has been anywhere commented upon, or even observed, either by laboratory experimenters or by practical gas-makers.

Finding that mercury could not be used to indicate the heat of the gases so near to the mouthpiece, and not having any other means at hand at the time suitable for the purpose, a thermometer was passed through a plug in the top of the ascension-pipe, keeping the bulb about 18 inches above the mouthpiece, instead of only 3 inches as before. A fresh charge of 2½ lbs. of coal was then put into the retort, and the temperature of the gases noted every minute.

In this and other experiments, some of which I give in a table appended, I again met with an unexpected result, and one which I do not think is generally accepted—namely, that the temperature of the gases evolved from any given weight of coal is highest when the quantity given off is greatest, or, in other words, the gases from the early part of the charge are hotter than those from the latter part; and also that the heavier the charge of coal the higher is the temperature of the gases during the most active period of production.

Temperature of Gas evolved from Coal at Different Periods of the Charge.

Time.	Quantity of Coal Carbonized.							
	4½ lbs.	3½ lbs.	2½ lbs.	2½ lbs.	2½ lbs.	1½ lbs.	1¼ lbs.	¾ lb.
Min.	Degs.	Degs.	Degs.	Degs.	Degs.	Degs.	Degs.	Degs.
1	363	—	416	350	420	420	—	382
2	482	—	490	496	520	494	—	476
3	506	550	506	514	532	494	440	466
4	512	529	501	508	530	474	506	436
5	518	516	495	506	512	444	494	402
6	526	510	483	502	492	414	466	362
7	524	502	468	492	488	390	430	332
8	524	495	458	482	460	374	408	312
9	524	490	440	462	450	362	382	296
10	524	508	412	462	442	350	362	270
11	544	490	390	445	—	338	346	250
12	520	484	376	438	436	328	334	228
13	528	476	366	436	—	317	326	210
14	526	460	362	434	422	306	319	200
15	536	460	360	434	—	290	308	192
16	532	450	356	436	412	278	294	185
17	526	422	355	426	—	260	282	178
18	520	418	352	417	—	242	267	173
19	518	406	350	422	—	228	250	171
20	506	406	348	418	382	212	234	168
21	498	396	344	408	—	200	218	165
22	476	400	334	388	—	188	208	162
23	460	376	322	372	—	182	198	160
24	456	372	312	360	—	175	191	157
25	414	362	300	349	370	170	186	155
26	398	348	300	338	—	164	—	—
27	404	332	284	330	—	160	—	—
28	396	308	280	322	—	—	177	—
29	382	288	278	304	—	—	—	—
30	386	270	272	284	—	—	—	—
31	385	254	264	270	206	—	—	—
32	380	238	252	258	—	—	—	—
33	378	230	242	247	—	—	166	—
34	373	214	232	234	—	—	—	—
35	372	202	218	222	—	—	—	—
36	360	194	198	212	—	—	—	—
37	352	186	186	196	—	—	—	—
38	338	180	174	186	—	—	—	—
39	324	172	170	180	—	—	—	—
40	316	168	165	174	172	—	—	—
41	312	—	162	170	—	—	—	—
42	302	—	160	167	—	—	—	—
43	284	—	158	164	—	—	—	—
44	272	—	155	162	—	—	—	—
45	260	—	153	160	160	—	—	—
46	248	—	—	—	—	—	—	—
47	238	—	—	—	—	—	—	—
48	232	—	—	—	—	—	—	—
49	220	—	—	—	—	—	—	—
50	214	—	—	—	—	—	—	—
51	206	—	—	—	—	—	—	—
52	200	—	—	—	—	—	—	—
53	196	—	—	—	—	—	—	—
54	192	—	—	—	—	—	—	—
55	188	—	—	—	—	—	—	—
56	184	—	—	—	—	—	—	—
57	182	—	—	—	—	—	—	—
58	180	—	—	—	—	—	—	—
59	176	—	—	—	—	—	—	—
60	172	—	—	—	—	—	—	—
	Cub. Ft.	Cub. Ft.	Cub. Ft.	Cub. Ft.	Cub. Ft.	Cub. Ft.	Cub. Ft.	Cub Ft.
Gas made . .	9·5	9·0	9·3	10·3	5·2	6·1	3·5	
Per ton . . .	9457	8960	9258	10,254	9318	10,931	10,427	
Illum. power, sperm cands.	—	17·91	—	16·78	18·48	—	—	

The tabulated results show some apparent anomalies, but they may reasonably be accounted for by irregularities in firing the furnace, and by atmospheric disturbances from opening and shutting doors. They do, however, I venture to think, open up a wide field for investigation and study, and I hope to have the privilege, on a future occasion, of giving the results of other experiments correlating temperatures, illuminating power, and yield of gas.

It may be necessary to mention, in order to show that high temperatures are not simply the result of laboratory work, that an attempt was made to take the temperatures at an ascension-pipe in the retort-house in the ordinary course of working; but the thermometer, which was placed about 3 feet above the mouthpiece, was destroyed at 645°. What the actual temperature on the occasion was I had no means of ascertaining, but that it was above that of boiling mercury there can be no doubt.

Gas-Works, Cheltenham, May 4, 1878. R. O. PATERSON.

Parliamentary Intelligence.

HOUSE OF COMMONS.

MONDAY, MAY 6.

Hemel Hempsted District Gas Bill,—read the third time, and passed.

East Retford Borough Bill, Stoke-upon-Trent Corporation Gas Bill,—as amended, considered; to be read the third time.

Hamilton Burgh Bill,—as amended, considered; amendments made; to be read the third time.

Castleford and Whitwood Gas Bill (Lords), Clitheroe Gas, Water, and Improvement Bill (Lords), Normanton Gas Bill (Lords),—read a second time, and committed.

Trowbridge Water Bill (Lords),—read the first time, and referred to the Examiners.

Metropolis Water-Works (Purchase) Bill,—adjourned debate on amendment on second reading, further adjourned to Friday, May 10.

A petition against alterations in the Newry Gas Bill (Lords) was presented from Newry Gas Consumers Company, Limited.

A petition against the Warrington Water Bill (Lords) was presented from the Corporation of Warrington.

TUESDAY, MAY 7.

The Examiners reported that no Standing Orders, not previously inquired into, are applicable in the case of the Warrington Water Bill (Lords).

Local Government Provisional Orders (Droitwich, &c.) Bill,—to confirm certain Provisional Orders of the Local Government Board under the provisions of the Gas and Water Works Facilities Act, 1870, and the Public Health Act, 1875, relating to the Borough of Droitwich, the Local Government District of Ilkeston, the Borough of Saffron Walden, and the Local Government District of Tow Law—ordered to be brought in by Mr. Salt and Mr. Sclater-Booth.

The Drumcondra, Clonliffe, and Glasnevin Township Bill was referred to a Select Committee consisting of Mr. Portman (Chairman), Mr. Foljambe, Colonel Arbuthnot, Mr. Elliott, and Mr. Bonham-Carter (Referee); to meet on Tuesday, May 14.

The Grand Junction Water Bill was referred to a Select Committee consisting of Sir Joseph Bailey (Chairman), Mr. Ion Hamilton, Mr. Brocklehurst, Mr. Blake, and Sir John Duckworth (Referee); to meet on Thursday, May 16.

WEDNESDAY, MAY 8.

Marske and Saltburn Gas Bill,—Lords amendments agreed to.

Maryport Improvement Bill,—read the third time, and passed.

Local Government Provisional Orders (Droitwich, &c.) Bill,—read the first time, and referred to the Examiners.

THURSDAY, MAY 9.

The Examiners reported that the Standing Order, which is applicable to the Gas and Water Orders Confirmation Bill, has been complied with.

East Retford Borough Bill, Hamilton Burgh Bill, Stoke-upon-Trent Corporation Gas Bill,—read the third time, and passed.

Public Health Act (1875) Amendment (recommitted) Bill,—considered in Committee of the whole House, and reported.

The *locus standi* of the following petitioners against the Castleford and Whitwood Local Board Bill (Lords) has been disallowed:—(1) Surveyors of Highways and Overseers of the Poor of Allerton Bywater and others, (2) Overseers of the Poor and Owners and Ratepayers of Fryston, (3) Charles Wheler and others, except so far as affects Charles Wheler.

POLLUTION OF RIVERS.

Mr. TENNANT asked the President of the Local Government Board whether any, and, if so, what steps have been taken by Her Majesty's Government to put in force the provisions of the Rivers Pollution Prevention Act of 1876, and with what results.

Mr. SCLATER-BOOTH said: The duty of putting in force the provisions of the Rivers Pollution Prevention Act of 1876, as my honourable friend is aware, does not devolve upon the Government, but upon the Local Authorities. So soon as the Act came into complete operation, which was not until August, 1877, a circular was issued by the Local Government Board calling the attention of the Local Authorities to their powers and duties under the statute, and applications immediately began to come in from various quarters—firstly, for certificates; secondly, for extension of time; and thirdly, for consent to proceedings being taken. I may mention, to show that the operation of the Act has been widely spread, some of the places where proceedings have been taken—viz., Salisbury, Canterbury, Barnet, Wigan, Grantham, Isle of Wight, Withington, Hereford. But perhaps the most important result of the Act has been the prevention of fresh pollution of rivers, as no loan for sewerage works is now sanctioned unless provision is made for the purification of the sewage.

FRIDAY, MAY 10.

Manchester Corporation Water Bill,—as amended, considered; to be read the third time.

Radcliffe and Pilkington Gas Bill,—reported.

York United Gas Bill (Lords),—reported, without amendment.

METROPOLIS WATER-WORKS (PURCHASE) BILL.

Sir J. M'GAREL-HOGG gave notice that on Monday, May 13, he would ask leave to move to discharge the order for the second reading of the Metropolis Water-Works (Purchase) Bill.

SATURDAY, MAY 11.

A petition against the Metropolis Water Supply Bill (the petitioners not praying to be heard) was presented by Mr. John Holms, from the Hackney District Board of Works.

HOUSE OF COMMONS COMMITTEE.

MONDAY, MARCH 18.

(*Before the Marquis of* LORNE, *Chairman*; *Mr.* STARKEY, *and Mr.* ERNEST NOEL; *Sir* JOHN DUCKWORTH, *Referee.*)

CHELTENHAM WATER BILL.

CHELTENHAM CORPORATION WATER BILL.

(*Concluded from p.* 715.)

Mr. *Robert Etheridge*, F.R.S., Vice-President of the Geological Society, said he was attached to the Geological Survey. He was acquainted with the springs and streams of the Dowdeswell Valley. It was peculiarly adapted for the supply of Cheltenham; the land was chiefly pasturage, and not highly cultivated. He knew the site of the proposed reservoirs. There was no source of contamination, and it was difficult to imagine a valley with better catchment and better adapted for the formation of reservoirs.

Mr. POPE said the previous Thursday the Committee asked Mr. Bateman about the offer made to the Company, but Mr. Bateman was unable to give any information. It was only right, however, that the Committee

should know what offer had been made. It was contained in a letter from the Town Clerk, on the 13th of March inst., and it was a better offer than that which had been before made on behalf of the Corporation. That offer the Corporation were quite prepared to abide by. The letter was as follows:—

3, *Whitehall Place, London, S. W., March* 13, 1878.

Dear Sir,—I am instructed by my Committee to make you an offer equivalent to 25 years purchase on your maximum statutory dividends in perpetual annuities; that is to say, the annuities equivalent to the interest paid on your preferred stock, and annuities equivalent to 10 per cent. on your ordinary share capital of £55,625; the Corporation taking over the mortgage debt, but free from all other charges and incumbrances.

This is the utmost we can give, and must be considered our ultimatum.

We shall expect to receive your reply by one o'clock to-day.

I think it right to add that we reserve to ourselves the right to give this offer in evidence.

Yours truly,

E. L. Griffiths, Esq. E. T. Brydges.

He ought to tell the Committee that the previous offer of the Corporation was 25 years purchase upon the preference and guaranteed stock, and 22½ years upon their ordinary stock. This offer was 25 years purchase upon both kinds of stock. He did not know whether there was any reply to that; if so, he would read it; if not, he would say that it was declined, and that the Company did not consider the offer adequate.

Mr. Michael: We do not say it is inadequate. We decline the offer.

Mr. Pope: Very good. We will take it so.

Mr. *Easton*, C.E., said he had found great advantage to result from the water supply being in the hands of Local Authorities. He had had practical experience in more than one instance of this advantage, and he was decidedly of opinion that, especially with regard to the supply of the poorer parts of a town, things were better managed where the supply was in the hands of the Sanitary Authority, because the supply was not dependent on the profit of the undertaking. He had been consulted in many cases of transfer to Corporations by voluntary arrangement, and also in cases of compulsory purchase, as at Birmingham.

Mr. Michael: There have been only two such case, and in one—the Stockton case—the matter is not yet concluded.

Sir J. Duckworth remarked that there were peculiarities in that case.

Witness (continuing): I think the offer made by the Corporation is the full and fair value of the undertaking. The offer made is as much as the Corporation ought to give for it—quite the maximum.

Mr. Pope: Do the reasons which you say generally prevail in favour of the transfer of water-works to Corporations, prevail in a more or less degree with regard to Cheltenham?

Witness: They apply with greater force in the case of Cheltenham, than in any case that has come before me, the fact being that the poorer classes of houses are not supplied at all. The Company have simply taken the better houses, and left the poorer classes to shift for themselves. I have taken the calculation of Mr. M'Landsborough, and find there are 9137 houses in Cheltenham district, with a rateable value of £244,000, and a probable population of 52,700. Of these, 3100 houses, or about one-third, are supplied by the Company, of a rateable value of £145,000, or about one-half the total value, and a population of 18,500, or little more than one-third. Not more, therefore, than one-third of the population is actually supplied, and the class of houses not supplied is just that to which, if the supply is not the more valuable, it is occupied by those least able to supply themselves. The extreme daily supply of the Company in time of drought is 5 gallons per head over the total population, or 13½ gallons on the population actually supplied—a total supply having been stated of 231,000 gallons. That is not a state of things that ought to have been permitted to exist since 1865.

Mr. Pope: Speaking apart from the *laches* of the Company, and merely as a Water Engineer, which scheme do you think is the better for Cheltenham?

Witness: I am of opinion that the Dowdeswell Valley scheme is decidedly the better, for two reasons—first, the water is better; and, secondly, the expense is much less, both as to first cost, and also as to working expenses afterwards. It therefore must be better in the interest of the ratepayers. I have been carefully over the quantity of water, as gauged in the springs, and over the calculations of Mr. Bateman, and am prepared to support them to the fullest extent. I believe an adequate supply for many years to come can be obtained, and, knowing the watershed for many miles, I believe there are other springs that may be brought into the system, and at a low cost. The circumstances of Cheltenham are not such as those of Manchester, the population increasing at a very moderate rate, and there being no large demand for trade purposes. I believe that the interest of the town would be best promoted by the Corporation scheme.

Cross-examined by Mr. Michael, witness said he had not calculated the extent of the watershed himself. He had taken the figures of Mr. Bateman and Mr. Hawksley, and had not gone into them himself. He contemplated a supply of 1,000,000 gallons per day by the Corporation scheme. He allowed for 90 days storeage, which he considered to be quite sufficient in the case of a town like Cheltenham. It was found sufficient in the case of Falmouth. He did not know there was a large difference in the rainfall of the two places; he believed it was about 30 inches each. He did not believe the Falmouth rainfall was 40 inches. He did not know anything of whether the Corporation had conformed to the requirements of the Public Health Act with reference to the Company. There was an objection on the part of the ratepayers to the putting in force of those requirements when a Company were concerned, because of the payment of profit to a private undertaking. He considered that the Company had been in default since 1865, when they admitted they had only 5 gallons per head per day, and they had no more now.

By the Committee: The peculiarity in the Stockton case was that the Company there were not only paying statutory dividends, but had in hand an income of from £8000 to £10,000 beyond, and an ample supply of water.

Mr. Michael: Ought you not to say that they had applied twice to Parliament for a further supply?

Witness: I was going to add that they applied a second time for a supply from the very same source that had been before refused.

This concluded the evidence.

Mr. Pope then summed up the case for the Corporation. He said that the question to be decided in this case depended on two or three broad principles and one or two leading facts, rather than upon any details, however interesting those details might have been. He might at once admit that it had not been usual—in fact, it had been very unusual, for Parliament to compel the acquisition of private undertakings; but Parliament had set itself to promote such acquisition, though it had hesitated to place its hands compulsorily, except under exceptional circumstances, upon the property of Shareholders. But it would be well to look at the policy of Parliament as well as at what it had done in specific cases. With this view he referred the Committee to the Public Health Act of 1875 as the latest exposition of the opinion of Parliament, and which he would strive to apply to this case. If they referred to section 31 they could not doubt that Parliament meant to say that, if they had to start this question again, the proper parties to supply water for a district were the Local Authority, because the operation of sections 51 and 52 was to give the Local Authority power to supply water subject only to such restrictions as Parliament considered necessary for the protection of Water Companies. Section 51 gave power to acquire existing water-works; but section 52 provided that before obtaining a supply of their own, the Local Authority should take certain steps which were considered to be sufficient and proper to ascertain whether the Company were able and willing to perform the statutory duty which Parliament cast upon them. That was, the general mind of Parliament was shown to be that Local Authorities were to be authorized to establish works of their own rather than to acquire water, under certain circumstances; and it would be consistent with the principle established by Parliament that the Committee should, in this instance, authorize the works the Corporation felt disposed to carry out, rather than give them the works of the Company; and he told the Company now, as he told the Committee, that the Corporation had asked for the power they had, not because the Corporation wished to acquire the works of the Company, but in order to get a supply for Cheltenham; and if the Committee would strike out the compulsory provisions altogether, and allow the Corporation to have the supply they asked for, they would be quite satisfied with the decision. But he knew the Company would say that that was unfair to them, and he wished it to be understood that the Corporation admitted it, but that they did not wish to acquire the Company as a source of profit, for they did not consider they would repay themselves at the offer they had made; but they thought it fair, though not necessary, that when they came to ask for new works they should also come for powers to buy the Company out. But if the Committee were satisfied that the Company had been guilty of *laches* in times past, it would be quite within the spirit of parliamentary practice to give the Corporation power to form works, even though they did not give the power to purchase. But he did not suppose that the Company would ask the Committee to split the Bill in this way. That, however, was the basis on which the Corporation applied to the Committee; if the Company were unable to do what they ought to do, power should be given to the Sanitary Authority to do it. The Corporation started with this proposition—that since 1865 the Company had kept Cheltenham short of water, notwithstanding frequent protests from the Corporation (whether in the form provided by the Public Health Act or not) and they had this fact conceded by the Counsel of the Company, that they would have continued to keep the town short, but for the action taken by the Corporation in promoting their Bill. Mr. Venables expressly said that the Company's Bill was introduced in consequence of the Corporation bringing in their Bill. By the confession of the Company the necessity of the application on the part of the Corporation was admitted. For 13 years there had confessedly been no sufficient supply of water; there was still not water enough; and there would have remained not water enough if the Corporation had not introduced their Bill. If anything were needed to show that the Company were not prepared to do their duty, was not the proof conceded, and were not the Corporation justified in saying that in accordance with the spirit of the Act of 1875, the Committee were in a position to authorize the Corporation to form works of their own, because the present works were in the hands of a Company who were not prepared to supply enough water for all reasonable purposes? Supposing the Corporation had founded their case upon the speech of the Counsel for the Company, and without a particle of evidence, was there any answer to the proposition? Some answer was suggested to it by Counsel, in the question, had the Corporation complied with the provisions of the Act? If those provisions had been complied with, and the Company had failed to supply what was required, it would not be necessary, except as to the acquisition of land, &c., to come there at all. Under sec. 52, except as to getting powers to acquire land, the Corporation would be able to have works of their own with or without parliamentary sanction; but before doing so it was necessary to give notice to the Company in a certain manner, and no such power was given so long as the Company were able and willing to supply water for all reasonable purposes required; and any differences as to whether the water was sufficient or reasonable were to be settled by arbitration. But in this case no arbitration was necessary, because it was conceded by the Company that they had not a sufficient supply, and that they would not have come to Parliament now if the Corporation had not done so. But even if the Company alleged that all the proper measures were not enforced, they had heard from Mr. Brydges the reason why the Corporation could not enforce them, because the Company were not prepared to supply closets without an extra charge, which the Corporation were not able to exact. Without any question of Severn water or spring water, they had a Company who had existed for 13 years without the power to supply Cheltenham, and they only applied now for that power because the Corporation had also come to Parliament. And the principle upon which Parliament had legislated was that, if a Company were not able to supply a town, the Corporation should have the power to do so given them. If the Company would ask the Committee to throw out the purchase clauses, he should be content, if the Corporation were given the power of supply they asked for, knowing, as he did, and as the Company knew, that it would ultimately lead to the purchase of the works. If the condition of things was as he had stated, was not this a case in which the Corporation were justified in their proceedings? Not only for thirteen years had the Company left Cheltenham without an adequate supply, but they now came to Parliament with a scheme of supply which was rejected in 1865. If there was any need of analogy between this case and the case of Stockton, it was to be found in this fact: After leaving the borough for thirteen years in a condition of water famine, they now come before Parliament with the same scheme which was rejected in 1865, and without the insertion of the provision for the dual service which was imposed upon them in 1865. He did not ask the Committee to decide between the doctors in this case, but he thought he should speak the sentiments of all laymen when he said that he should not be satisfied to drink water because Dr. Tidy said it was safe to drink it when other scientific men, quite as able, declared to the contrary. The gist of the thing was, that experiments such as these, as to the unwholesomeness of the water, were experiments which were especially undesirable in the case of such a town as Cheltenham, and where there was so strong a feeling against it, Parliament ought not to impose water upon a town when the governing body of that town were willing to provide a supply elsewhere, and from an unobjectionable source. But the Company were asking Parliament not merely to gloss over their shortcomings, but to force upon the people of Cheltenham, in the Company's own interest, a supply which a large proportion of the people believed to be injurious, and in face of the fact that they were prepared to supply themselves from a source against which there was no complaint, and at a much shorter distance. He was not going to ask the Committee to say that the Severn water was not fit for domestic use, but he did say that whether it was so or not, if the supply could be obtained from a source against which there was not even, it may be, a fancied objection, the preference ought to be given to it. Supposing the Severn water to be fit water for Cheltenham, were the Committee going to force it upon the people and make them adopt it when they were willing to get their own supply? In the petition of the Company against the Corporation Bill not a word was said against the estimates or the quantity of the water, and but for the fact of the Company themselves going to the Severn there would

not have been a word said against the Dowdeswell scheme. Was it unfair to say that the Committee were dealing with a Company who not only had not done their duty for 13 years, but were now seeking to force upon the town a supply which it objected to, with the only excuse that Dr. Tidy said the objections were fanciful? The Committee were not dealing with a town that required a large supply of water, and in which the abundance of the supply might make up for a deficiency in quality, but the prosperity of Cheltenham depended, so to speak, upon "fancy," and upon the reputation it bore with people who resorted to it for health, or who, having relinquished the active pursuits of life, went to it to spend their days in a place which they believed to be a healthy one, and for its pleasant associations. As the noble Chairman of the Lords Committee said in 1865, any notion that the water supply could not be depended on would be ruin to a town like Cheltenham. It was one of the sanitaria of the country, as one of the witnesses had said, and it ought to be maintained so, without forcing upon its inhabitants a supply to which there was so strong an objection. Were the Committee going to send the Corporation back to Cheltenham, and compel them to say to their people, that notwithstanding what was said by a man like Dr. Frankland and by their own Medical Officer of Health, they were, by the decision of a Parliamentary Committee, forced to impose this water upon them? He asked the Committee whether he had not carried this case beyond the provisions of the Public Health Act, because he had proved that the present application of the Company was wrong in its inception, and because it sought to force upon Cheltenham a supply which a large majority of the community fancied, at any rate, would be an injurious one. He did not propose to say more. He did not propose to go into the details of the evidence. In the hands of Mr. Bateman he felt sure that he might leave those details, so far as the engineering works were concerned, and he quoted from Mr. Bateman's evidence to show that the proposal of the Corporation was equal to a supply four times the quantity now required by the town, and to a supply of 20 gallons per head daily, which was held to be amply sufficient for a town like Cheltenham. The whole of the case lay in this: If Parliament, in the Act of 1875, expressed the opinion he had tried to draw from the construction of the Act itself, were the Corporation not in the position of a public body seeking to construct works which Parliament said ought to be permitted where the Company were not equal to the supply? Had the Corporation not brought themselves into a position to acquire the works, not as wishing to make a profit from them, but as avoiding the competing works which would otherwise be necessary? And had not the case been brought within the precedent of Parliament when the Company, for 13 years, had not carried out their duty, and now only proposed to apply for a supply which Parliament had before rejected, and without the provision which Parliament had imposed.

Sir E. Beckett replied upon the whole case. He said he should like to know within what precedent the Company had been brought. The Stockton case had been referred to, but he did not wonder that it had been touched very tenderly, for his learned friend must be quite aware that no precedent was established by it. There was indeed no such precedent. Mr. Pope had himself opposed a similar proposal in the case of Ramsgate; Nottingham was another instance, and at Sheffield the Bill was completely abandoned because of an adverse decision given just previously. In not a single case had a Corporation been allowed to set up a Bill of their own when a Company were before Parliament. He disputed that the policy of Parliament was as argued by Mr. Pope with reference to the Public Health Act, and referred to the Municipal Corporations (Borough Funds) Act in support of his contention. That Act was passed to enable Corporations to go to Parliament to oppose Bills and to give them the power they did not before possess to charge the costs in the case of failure and, under certain conditions, upon the rates; but that power was expressely governed by the condition that Corporations should not apply the power to the starting of any competitive works to existing Water or Gas Companies. Could there be any stronger indication than this of the will of Parliament? The results of such applications, within his experience, extending over the past 30 years, had been that Parliament had uniformly laid down that Corporations should never be allowed to establish competing works against existing Companies. He knew of cases in which the supply of water was admittedly inadequate, but in which it had been always laid down that before a Corporation could furnish a supply the existing works must be purchased. There were terms on which this Company, being merely a trading Company, would consent to sell their works, and there were also terms on which they could not be expected to do so; and under this latter category he classed the offer now made by the Cheltenham Corporation. He read the letter from the town clerk, as already given in evidence, and said he need scarcely dwell upon the arbitrariness of its proposed mode of dealing with the Company. How did the Corporation know what were the debts or obligations of the Company? What about the costs of these proceedings? The offer was one which he objected to not only for the manner in which it was made, but as one by which the Shareholders in the Company would not be allowed to go out of the concern with the same income as they now derived from it. He asked any of the Committee having land which was required to be taken compulsorily, what they would think of an offer to pay them only as an annuity what they had been receiving from it hitherto? They all knew the sort of terms which were usually given in such cases, and they were terms very different to these; these were such as merely supplied the data from which an arbitrator would work. In the Stockton case, though the result was not yet known, the arbitrator was authorized to give something for the compulsory purchase and something for the prospective profits of the Company; but nothing of the sort was done in this case. The offer was, indeed, ridiculous; nay, it was more than ridiculous; under the circumstances, it was an insult, not only for the matter of it, but for the manner in which it was communicated. The Stockton case was the only case in which compulsory purchase was sanctioned, and he read from the Act authorizing it to show that the circumstances were exceptional; and though in that case the award of the arbitrator was not yet given, they might be sure that something substantial would be given for the compulsion. So that in addition to the 25 years purchase offered by the Corporation in this case, the Company were entitled to a sum for compulsory purchase and for prospective profits. He asked who would put this at less than an additional five years purchase; but even putting it at an additional two years, one for the compulsion and the other for prospective profits, it would be sufficient for his purpose and to show that the offer of the Corporation was not one that could be entertained. Referring to the Birmingham case, he argued that that was not a case of compulsion, inasmuch as it was based upon an agreement between the parties, and that as to the proposal to sanction a competing scheme there was no case of the kind. He was anxious to see how his learned friend would deal with the scientific evidence in the case, and he (Sir E. Beckett) remarked strongly upon the absence of any comment thereon, and characterized the opposition to the Severn water as founded, like that to the Thames, upon the "monthly guesses" of Dr. Frankland, whose evidence and theories he denounced in the strongest terms, as also those of his "usual satellites," Dr. Hill and Mr. Way. His friend had found it impossible to stand by the evidence of his scientific witnesses, and had therefore thought it right to drop them, and to rely upon the sentiment of Cheltenham. If the sentiment of Cheltenham was sufficient to make them buy the works of the Company at a fair price, he was quite content to let that sentiment have its way; but the fact was they wanted to indulge their sentiment and yet have the works at their own price. To indulge such a sentiment at the expense of the Company was a proposition which Parliament never entertained, and, he believed, was not likely to do. Referring to the proceedings of 1865, he said it appeared to have been forgotten that the House of Commons then passed the Bill of the Company, and passed it after a mode of inquiry, which then prevailed, by referees who reported on the good quality of the water. Instead of asking Parliament to reverse its former decision, he asked the House of Commons to uphold the decision it had before come to. It might be said that the House of Lords, when it threw out the Bill as regarded Cheltenham, had something before it which was not before the House of Commons. But was it so? If so, why was the Bill sanctioned as to Tewkesbury? The decision to grant the supply to Tewkesbury affirmed the satisfactory character of the supply, and as to Cheltenham, the imposition of the dual service was made under a misapprehension, and without taking into account the fact which had been stated in evidence, that the supply needed for Cheltenham was only required for domestic purposes. The compromise thus suggested by the House of Lords in 1865 was impracticable, and he argued that it was the Company and not the Corporation who were now carrying out the wishes of the one House explicitly, and of the other inferentially. Having remarked on the absence of any witnesses from Tewkesbury against the Severn water, and upon the strong evidence in its favour from that place, the learned Counsel said that since then the Rivers Pollution Act had been passed, and, though he did not say that as a matter of sentiment, it was not preferable to have the sewage taken out of the Severn, the Pollution of Rivers Act was passed to effect that object, and it was strange now to come and say that the water was not to be taken because of these things which the Act had given the power to remove. As to the Company having been in default since 1865, had the Corporation forgotten that about that very time the Commissioners rescinded the resolution they then had on their books requiring the Company to provide an additional supply? From that time down to the present the resolution had not been renewed, the reason being that the town had ever since been afraid, by renewing it, to make the works more profitable, having the purchase of those works in view. That showed the regard they had for the interests of the town. The Corporation had been proved to have asked the Company to do nothing that they had not done, and the Corporation had given no indication of their need, except by coming for this Bill, which was a very improper mode of indicating it, and one the cost of which they would be unable to recover under the Borough Funds Act. The Corporation had given no such indication, because they knew that the Company would have to go to the Severn, and that then they would be in a better position to meet them. No comment had been made by Mr. Pope on the sufficiency of the supply proposed by the Corporation; but Mr. Bateman's estimate, after scraping up the springs from all parts, only provided for a supply of 20 gallons a day to the present population, without any provision for future increase; and then only by providing for 180 days supply; but the learned Counsel asked if that was such a supply as a Company could contemplate. There could be no doubt that as regarded the Chelt scheme a blunder had been made, the author of which, unless it was the geological doctor, he did not know. He contended that the engineering details were as bad as every other feature of the case. In concluding, the learned Counsel said Mr. Pope had avoided touching upon the chemistry of the case, he had declined to touch the engineering aspect of the case, and he had failed to quote any precedent for the present application; while legality had been distinctly violated, in the bringing in of a Bill for a new supply in competition with an existing Company. The Corporation Bill was for an inferior and an inadequate supply and was one for the confiscation of the Company's property. If the Bill of the Corporation was now thrown out, he reminded the Committee there was nothing against its being renewed when the Corporation chose to behave fairly or even honestly in their effort to acquire the works of the Company.

The room was then cleared, and the Committee remained in consultation for half an hour. On the re-admission of the public,

The Chairman said: The Committee find the preamble of No. 1 Bill (the Water Company's Bill) not proved. The Committee now wish to inquire if there is the possibility of an arrangement for the voluntary purchase of the Company's works.

Mr. Brown asked for an adjournment to consider the question, which was granted.

Tuesday, March 19.

Mr. Pope said that since the decision of the Committee on the previous day, the Corporation had placed themselves in communication with the Company, and proposed a meeting for the purpose of endeavouring to come to an arrangement. The Company, however, declined the invitation, not feeling, as they said, that it would be desirable. That morning, however, an offer had been made by them to withdraw opposition to the Corporation Bill, on the same terms as Parliament had given in the Stockton and Middlesbrough case. The proposal, he supposed, was that terms such as those in the Stockton case should be inserted in the Bill. He might at once say frankly that, knowing the proceedings in the Stockton case, he could not advise his clients to proceed with a Bill in which such terms were inserted. The two cases were not analogous, and seeing that the insertion of such words as were used in the Stockton Act, made an allowance of compensation for compulsory purchase and prospective value a statutory direction to the Arbitrator, he held that the Company were not entitled to such compensation in this case, and he objected to such a statutory direction. The Corporation were quite content to go to an open arbitration, or, being anxious only for an adequate supply of water, they would be quite content to go on with their Bill, giving the Company power to call upon them, at any time within five years, to purchase their works by arbitration. While they were not willing to accept, for the relief of Cheltenham, any Bill containing such conditions as in the Stockton case, the Corporation were prepared either to submit to arbitration or to take their Bill on the conditions he had stated.

The room was then cleared, and on the parties being re-admitted,

The Chairman said the Committee regretted that the opportunity furnished for coming to an arrangement for voluntary purchase had not been successful, owing to the fact that the Company insisted on terms drawn from the Stockton case—a case which the Committee considered not to be analogous. He advised them again to consult with a view to a further proposal, and said that for this purpose it might be desirable to adjourn until a later hour in the day.

On the re-assembling of the Committee,

Mr. Pope said an agreement had been come to between the parties, the heads of which he would read. They were—

1. The Corporation to pay 25 years purchase of the dividends paid by the Company on their different stocks, taking the dividend on their ordinary stock at 10 per cent. The Company to have the option of perpetual annuities to this amount, or a capital sum equivalent thereto.

2. The Corporation to pay to the Company a sum of £5000 in discharge of all debts and liabilities, exclusive of mortgage debt.
3. The Corporation to continue payment of two small annuities of £100 a year and 8s. a week, to which the Company are now liable.
4. The Corporation to continue to employ the Company's Manager for three years, at his existing salary of £600 a year, or give him compensation.
5. The works to be taken over from the 24th of June next, up to which time all receipts are to belong to the Company, and all liabilities to be discharged by them.

The Committee then adjourned to give time for the foregoing terms to be embodied in the Bill.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

METROPOLITAN BOARD OF WORKS.

ABANDONMENT OF THE WATER BILLS.

At the Meeting of the Board on Friday last—Sir J. HOGG, M.P., in the chair,

A report was presented by the Works and General Purposes Committee recommending that monthly gaugings be taken, at a cost of about £120, of some of the more important chalk wells which have been measured during the past few months, so as to complete a year's gaugings.

Mr. RUNTZ moved the adoption of the report.

Mr. WATKINS said he decidedly objected to the recommendation. This was a proposed continuation of the costly experiments which had been undertaken for the purpose of procuring evidence in support of the Water Supply Bill. The Board had been promised, on the condition that a certain motion was withdrawn, that no further expenditure should be incurred in respect of this Bill; but now they were asked to consent to an additional outlay of £120. He thought this would certainly be a waste of public money, and he trusted that the Board would not assent to the suggestion.

Mr. LEGG asked if any idea could be given to the Board as to the actual amount already expended in these gaugings.

The CHAIRMAN said he could not tell.

Mr. H. L. TAYLOR said he should consider the expenditure was most desirable if there was the least chance of the Board ever being entrusted with the control of the water supply of the Metropolis. But did any one believe they would? Therefore the proposed outlay would be a positive waste of public money for no purpose. These gaugings might be of value to some professional men—he did not deny that, but he doubted whether the Board were justified in spending the ratepayers money in gaining information for the enlightenment of outside professional men. It was not a question of amount, but of principle. Would the Board spend £120 for such an object?

Mr. WALKER: I hope so.

Mr. H. L. TAYLOR: I know there are some members of the Board who have water on the brain.

Mr. WALKER said he could understand the reason of the opposition of the honourable member for the City of London. It all arose from jealousy, and because he knew that, if the Water Bills had gone forward, the Corporation would have had to take water from the Metropolitan Board.

Mr. FREEMAN expressed himself favourable to the outlay, in view of some future action on the part of the Board.

Mr. CUFFLIN said the Board had, it was true, resolved to spend no more money in this direction, but the present recommendation related to an exceptional matter. Whether the Board should adopt the recommendation of the Committee depended very much upon what answer could be given to Mr. Legg's question. If a large sum had already been expended, it might be worth the supplemental outlay even if greater than now asked for, to continue and complete the investigations even if it were only for the benefit of professional men hereafter. As to what the actual cost hitherto had been, he thought the Engineer could easily answer the question.

The CHAIRMAN said he was just about to suggest that Sir Joseph Bazalgette, who made the recommendation to the Committee on the previous Monday, should state his views to the Board. The Committee were anxious not to expend any more money themselves, and thought it better that the step, if taken at all, should be taken by the Board.

Mr. LESLIE said he should like Sir Joseph to inform the Board what he considered "the more important chalk wells."

Sir JOSEPH BAZALGETTE: In the first place, I wish to say that I believe there has not been a large expenditure upon this branch of the inquiry. But the importance of the inquiry does not depend upon the amount expended. I cannot name the figure, but I think I can say it is comparatively a small one. It is exceedingly important that the inquiry, which was commenced some few months ago, to be made complete, should be continued for a year, that we should know the exact amount of rainfall at different periods, and this cannot be determined unless the inquiries extend over a year. The information already obtained is incomplete unless we know the quantity of water in the chalk wells in the remaining months of the year, and the extent to which the yield is affected by the rainfall. As to which are "the more important chalk wells," what I mean is this: We had some 400 wells gauged in the area on the south side of the Thames, and probably the same number on the north side. Now, with the view of making the continuation of these experiments as economical as possible, I do not propose to continue the inquiries in regard to the whole of them, but to take certain lines or sections across the chalk, which show the flow of water underground, and make the experiments upon the wells lying in that direction. These I call the more important on account of being largely on the line in which we find the water in the chalk is flowing. Probably about half the former number experimented upon will be sufficient.

Mr. WATKINS: Considering the large amount of rainfall during this year, will the information you are now obtaining be of any use should next season be a dry one?

Sir J. BAZALGETTE: We do not know that there will be a larger rainfall than usual this year. There has been an extraordinary rainfall for a short time, but it does not follow on that account that the average of the year will be larger than usual. We want to know what effect the rainfall has on the chalk, the time it takes to reach the chalk, and how far it varies. What the result will be can only be ascertained by inquiry.

Mr. LESLIE: I should like to ask whether all this information is not to be found in the proceedings of the Institution of Civil Engineers.

Sir J. BAZALGETTE: No. I have made very careful search into the records of the Institution, and such information does not exist.

Mr. LEGG: When did these gaugings of yours commence?

Sir J. BAZALGETTE: I think we commenced in November last, and therefore should continue to the same period this year. I have estimated the expenses as nearly as possible.

Mr. H. L. TAYLOR: I should like to know whether the information you are seeking will be of any advantage to you in connexion with the main drainage of London.

Sir J. BAZALGETTE: No.

Dr. BREWER having supported the recommendation of the Committee, The report was adopted.

The Works and General Purposes Committe brought up another report, which stated that they had proceeded, on the resolution of the Board of the 17th of April last, referring it to the Committee to consider and report as to the course to be taken with the two Bills relating to the water supply of the Metropolis, and they had arrived unanimously at the conclusion that, on the ground that the session is so far advanced, and having regard to the state of the business in the House of Commons, the Board do request the Chairman to take such steps as may appear to him expedient to stay any further proceeding on the two Bills.

Mr. RUNTZ, in moving the adoption of the report, said the Committee came to this conclusion with great reluctance. They felt the importance of going on with the Bills; but, under the circumstances, having regard to the fact that, if they got the Bills so far advanced as to come before a Select Committee, a large expenditure would be incurred for professional evidence, without any hope whatever of passing either measure this session, they had resolved unanimously to recommend that both Bills be withdrawn.

Mr. LEGG said he rose with a great deal of pleasure to second the motion.

Mr. WALKER said he should move an amendment. The whole of the vestries, with the exception of St. Pancras, were ready to uphold the Board in going on with the Bills, and the Board had no official intimation that the Government would oppose them. To abandon the Bills at this time would be the triumph of might over right, of dirt over cleanliness, and therefore he would move—"That the Board request the Chairman to take such steps in promoting the two Bills as may appear to him most expedient in the interests of the ratepayers."

The amendment was not seconded. On the motion being put,

Mr. COOK said he wished to offer a few remarks. He felt great disappointment when he saw the recommendation of the Committee. A question of such importance as that of the water supply of London ought not to have been dealt with in the way in which the Board had dealt with it—first going on, or appearing to go on, with the Bills; then, frightened with the threatened opposition, withdrawing; and at length abandoning the scheme. If they were not prepared, after all the attention bestowed on the matter, to carry the Bills through, they ought never to have introduced them; if they believed the course hitherto taken was right, they should back them up with all their power. The recommendation of the Committee was a recommendation in the interest of delay, and he asked himself the object of delay. Very often delay was advisable so that time might be afforded for gathering up energy for a more vigorous progress hereafter. He did not believe the Committee had that object in view. He suspected delay was recommended so that the Board might drop the Bills this session and not re-introduce them next session. But why withdraw them? What was the nature of the opposition? Was it other or greater than they might have expected when the Bills were brought forward? Did the Board expect for a moment, when they resolved to introduce a Bill for the purchase of the water undertakings, that they would not have the opposition of the Companies? Did they suppose that the Gas Companies would not unite with the Water Companies in their opposition? Why, it was well known that, whenever a Bill was brought forward affecting any Joint-Stock Company, all the other Companies of that kind united to oppose and defeat it. One of the arguments usey against these Bills was the enormous expenditure which the schemes thed proposed would involve. But the figures brought forward by the officers of the Board clearly showed that, if they purchased the Water Companies at the present time, the inhabitants of the Metropolis would shortly be saving money by the transaction. It was quite a misrepresention to speak of the purchase as involving expense; it was in reality a saving of expense. The ratepayers had to pay water-rates now; they would only have to pay water-rates then—it would simply be doing the same thing in another form. What other opposition was there? He saw it stated in a newspaper some time ago that the Board had not sufficiently considered this scheme; that they had gone rashly into the matter. He could only say, in reply, that he had been a member of the Board for a great number of years, and during the whole of that period the water question had been constantly before them, and they had been assisted in coming to a sound judgment upon it by the evidence taken before Parliamentary Committees and Royal Commissions. In truth, it was the Board who had looked into the question, while those who set themselves up as critics of the Board had not properly considered it. Then it was urged that the Board were not the right authority to undertake the purchase of the Companies. Perhaps so, but then in municipal matters they must work with the best material at their disposal. If there were a larger municipal body in existence in the Metropolis, doubtless that would be the proper authority; but while Parliament was making up its mind as to what should be the future constitution of the Metropolitan Municipality, surely the public were not to be deprived of the best means at their disposal to remedy the existing state of things in relation to the water supply. The Board, as representing the ratepayers of London, felt it a duty to bring forward the Purchase Bill, and, until the constitution of the Board was altered, they could not be fairly blamed for endeavouring according to their lights, and on the best advice they could obtain, to put the water supply on a more satisfactory footing. The only important reason he had heard why the Board should now withdraw the Bills was the intimation given by the Home Secretary to a deputation which waited on him. He admitted that when an intimation came from a high official that he did not believe the Bills could be got through Parliament this session, there was something to act upon. But, upon examination, he (Mr. Cook) did not think that, after all, this was a reason for withdrawing the Bills. He confessed that he was disappointed with the statement made by the Home Secretary, as a member of a Government which came into power, taking for its programme *sanitas sanitatum*. Considering that there could not possibly be a more important question than the supply of pure water to this large Metropolis, he felt grieved that the Home Secretary should have intimated that the Board must not expect the Government to give their Bills its support. But having, at great pains and expense, brought forward their Bills, his advice to the Board was to go on with them, and let the House of Commons take the responsibility of their rejection. If they failed, let the people of London know that the fault lay with the Legislature, and not with the Board. The Board had already incurred the greatest amount of expense, which the promotion of the Bills involved, let them now go forward and meet their fate; let not the public say that the Board were faint-hearted. It must be borne in mind that they would never be able to purchase the Companies so cheaply as at the present time. Many millions of money would be saved if the Bill for effecting that object was passed in the present session. He hoped that there would be found a majority of the Board prepared to cast upon Parliament the responsibility of stopping or rejecting this great scheme, which was the most important they had ever brought forward in the interests of the inhabitants of the Metropolis.

Mr. FREEMAN said he had not lost one iota of his confidence in the correctness of the step taken by the Board in introducing the Bills, but at the present time the question was the proper course to be adopted

respecting the Bills, considering the circumstances of the case. The Board did their duty in bringing these Bills forward, but he had always felt that their fate depended principally upon the attitude of the Government. The Board could never hope to contend successfully against the opposition of the Companies, if the Government declined their assistance. Why did the Government oppose the Board in this matter? It was no use blinking the question—the Government had never done anything to make enemies for themselves. That being the case, it was for the Board to consider the most prudent course for them to pursue. If it were true, as stated by the last speaker, that the Board had already incurred the largest expenditure involved in the prosecution of the Bills, he would say, let them go on; but he believed the expenditure yet before them would be much larger than any they had yet incurred. With the Government against them, with an extraordinary amount of indifference towards the measures on the part of the inhabitants of the Metropolis, and with the vigorous opposition of the Companies, it was hopeless to expect they would succeed. He hoped that some future Government would feel it their duty to support a Bill for placing the supply of water to London in the hands of a central municipality.

Mr. ROCHE said he trusted that what had taken place in the House of Commons would be a lesson to the Board as to how they should introduce their Bills in future, and that when they found they were to be met by this persistent opposition, in the form of delay, with reference to their Bills which were introduced as public Bills, and that they were prevented from taking the opinion of the House of Commons on the second reading of those Bills, by reason of the forms of the House, which forms were made subservient to the interests of those who wished for delay, he hoped they would for the future adopt a different course, and introduce their Bills as private Bills, so that in the ordinary course they must come before the House, and the House must give its decision in regard to them. It must be borne in mind that the Board had two Bills before Parliament. There was the Supply Bill, to which, no doubt, there was considerable opposition in certain quarters. But the House of Commons had sanctioned the principle of that Bill by passing the second reading. It was no use for any one to attempt to delay that one. Its opponents never ventured to divide the House upon it, and its position now was that it was ready for a Select Committee. But it was advisable that the Purchase Bill should be referred to the same Committee, and, notwithstanding the latter stood for second reading on the 12th of March, and had been set down for that stage on several subsequent nights, the forms of the House had prevented it from proceeding. Under the circumstances the Board had to consider what was the proper course to pursue. Would they keep the Bill in existence merely for the chance of getting the opinion of Parliament on the second reading, knowing that they could not hope to pass it through Committee with any prospect of taking it up to the House of Lords this session? If not, there was no other course to adopt than to instruct the Chairman to take steps to withdraw it, so as to prevent useless expense being incurred. And let it be remembered that the Board would not thus be placed in any worse position than the Government itself would be sure to be in before long with regard to many of its own Bills. There would sure to be a considerable "slaughter of the innocents" by-and-by. He confessed that he was not surprised at the course the Government had taken with regard to these two water Bills. The Government was not desirous of mixing itself up in measures which might raise considerable opposition by interested parties. No useful purpose could be served by continuing to keep these Bills before Parliament; the wisest course, therefore, was to withdraw them, leaving the Board to determine next session what course they would adopt.

Mr. LESLIE said he observed that the last speaker was smiling the whole time he was addressing the Board, knowing as he well did that he himself was the cause of the whole mischief, and of the enormous expense to the ratepayers of the ridiculous measures called the public and private water Bills. Those who opposed these schemes from the beginning candidly stated their reasons for so doing, while those who promoted them shut themselves up in a small Committee, and lavishly expended the ratepayers money. For whose benefit?

Mr. RUNTZ rose to order.

The CHAIRMAN ruled that the honourable member ought not to refer to professional men who had been engaged by the Board in connexion with these matters.

Mr. LESLIE said he was only going to refer to the Board's own minutes to show that thousands of pounds had been received by those Engineers. He had made his objection before the Board's Auditor, but was not successful in getting these payments disallowed. He was amused to hear Mr. Freeman say that, if the present Government would not help the Board, they must wait, and try another. He fancied they would have to wait a long time, for they would not have much chance of carrying such Bills as these until the honourable member himself was Prime Minister. After what the Chairman told the Committee at their last meeting, to the effect that the Government intended to oppose these Bills, and would vote against them, it was, of course, impossible to hope for success, and therefore the best thing for the Chairman now to do was to try to get out of the scrape as soon as he could. It was to be wished he could get the ratepayers out of the scrape as easily. Unfortunately they would have to pay pretty dearly for this whistle, much dearer then when the Board took up the gas question. This little fantasy of Mr. Roche and Mr. Freeman would cost the ratepayers not less than £12,000.

Mr. H. L. TAYLOR said he thought they would have acted with more discretion if they had adopted the recommendation of the Committee without any observations whatever. For himself, he had always protested against a public body like the Board or the Corporation of London undertaking the question of buying up the Water Companies. Nevertheless, he thought that when the Board did enter on the discussion of so important a question, and every argument, *pro* and *con.*, had been brought forward, the minority should give way to the majority with regard to the prudence of going to Parliament for the necessary powers. This question had been before the House of Commons, and they must assume that the Chairman had done his best to help forward the Bills. There could be no doubt that, owing to the Chairman's political opinions agreeing with those of the present Government, facilities had been given to him which would not have been given by another Government. Surely now, then, was the time, if ever, when the Board might hope to succeed, and if with all their present chances they failed, he, for one, doubted whether they would carry their point, even with Mr. Gladstone as Prime Minister, and Mr. Freeman as Chancellor of the Exchequer. Discretion was the better part of valour, and, therefore, the wisest course open to the Board was to instruct the Chairman to withdraw both Bills at the earliest possible moment.

Mr. RUNTZ said that, after some of the observations that had been made in the course of the discussion, it might be supposed that the Board were becoming lukewarm on the subject of purchasing the water undertakings. That, however, would be a great mistake. Ever since the year 1867, when a Royal Commission was appointed to consider the question, there had been a growing feeling in favour of the transfer of these works to a public authority, and immediately after that Commission presented its report in 1869 the Board resolved to act upon its recommendation. Subsequently a deputation waited upon the then Home Secretary, Mr. Bruce, who intimated his opinion that nothing could be done until an alteration had taken place in the Municipal Government of London. Yet, in 1871, the Government itself introduced a Bill to enable the Board to buy up the interests of the Companies. In consequence, however, of the opposition of the Companies, the Bill was hastily withdrawn without any reason being assigned, and a Regulations Bill introduced in its stead. The Board felt then as they felt now, that it was exceedingly desirable that the Companies should be abolished, and that the supply of water should be vested in some public authority. It must be borne in mind that the longer the accomplishment of this object was delayed the more costly would it become. The income of the eight Companies in 1856 was £300,000, in 1866 it was £500,000, in 1873 it was £650,000, and in 1876 it was £750,000. Had the undertakings of the Companies been transferred in 1856, at 20 years purchase, they would have cost £6,000,0000; had they been purchased in 1866 they would have cost £10,000,000; in 1873 they would have cost about £13,000,000; whereas in 1876 they would have cost £15,000,000. This showed the importance of dealing with the matter as soon as possible, and he trusted that no more delay than was absolutely necessary would take place. The growing tendency of the age was in favour of the administration of the water supply by the Local Authorities, and in upwards of 100 towns in the United Kingdom this state of things existed. He regretted, therefore as much as any one to have to withdraw these Bills, and he hoped that the Board, or some other authority, would take up the question again at an early date.

The CHAIRMAN said that as his name had been mentioned several times in the course of the discussion, he thought it only fair to himself to state to the Board what he had already stated in the Committee. He did not in any way shrink from any amount of labour and trouble in connection with the Bills entrusted to his care, if he thought there was the slightest chance of their success. But he was bound to tell the Board most frankly that he did not think there was the ghost of a chance of getting the Purchase Bill read a second time this session, on account of the forms of the House, which prohibited the bringing forward of a measure upon which there was any opposition after half-past twelve o'clock. As Mr. Roche remarked, the second reading of this Bill had been down six times, and that evening it was down for the seventh time, without the remotest chance of being brought on. Not only had he no help from the Government in the matter, on the contrary, he had reason to believe that they would oppose him; and even were it otherwise, the state of public business was such that he could not expect to carry the measure any further. He would go a step beyond, and say that, after listening to what the Solicitor had stated, he did not think the Board would be justified, even were the second reading assured for that night, in incurring the necessarily large expense of getting evidence and professional assistance to go before a Committee, unless they had a certain prospect of being able to pass the Bill through the House of Lords in time for it to become law this session. For all these reasons combined, he concurred with the majority of the Committee in thinking the Board ought at once to withdraw the Bills.

The motion for the adoption of the report was then put and carried *nem. con.*, and the Chairman was requested to withdraw both Bills.

THE WHITE ELEPHANT OF STOCKTON AND MIDDLESBROUGH.

On Thursday, May 2, a Special Meeting of the Middlesbrough Town Council was held—the MAYOR (Lieut.-Col. Sadler) in the chair—"for the purpose of considering a precept from the Stockton and Middlesbrough Water Board, requesting the payment of £400,000 on the 27th day of June next, to pass such resolutions thereon as may be deemed requisite, and to order the corporate common seal to be affixed to the orders and minutes of the meeting."

The TOWN CLERK laid before the Council the following report of a Committee of the Stockton and Middlesbrough Water Board, presented to the Board on the 29th of April:—

In compliance with the request of the Board, we beg to submit the following estimate of the total cost of the water-works.

The 15th section of the Act of 1876 directed that the sum of £18,647, the maximum dividend of the existing share capital of the Company, should be paid to the Company in perpetual annuities, or, at the Company's option, 25 years purchase on that amount. The Company having elected the latter alternative, this item will stand as £466,175 payable by the Water Board.

Under the provisions of the same section, Mr. Higgins has awarded £213,802 in respect of compulsory sale and prospective value. The statutory debts and debts *bonâ fide* incurred, which, by the 15th section, are also payable by the Board, have been ascertained by the Chairman and Mr. Belk to exceed £106,000. We will take them at £110,000, though it is not unlikely they may reach £120,000.

We have thus a total of £789,977, composed as follows:—

Twenty-five years purchase of statutory dividends	£466,175
Mr. Higgin's award	213,802
Statutory and other debts	110,000
	£789,977

The Water Board have expended the sum of £17,207, of which we attach a short analysis for the information of the Board.

The Corporation have a claim against the Board of £17,154, in respect of the Parliamentary expenses incurred in the session of 1876. Of this, £8114 is claimed by Corporation of Stockton, and £9040 by the Corporation of Middlesbrough.

There has been a suggestion that the sum paid by the Corporation of Middlesbrough for the expenses of the opposition to the Water Company's Bill in 1875 should be repaid. If this is acted upon, it would involve the payment to the Corporation of Stockton of the amount expended by that Corporation for the same purpose.

The expenses of the arbitration are not yet paid, except so far as they are included in the amount of £17,207, and set out in the analysis of this amount. It is impossible to arrive at any trustworthy estimate of this item.

Resuming the above figures, we have the following as the cost of the water-works, as far as ascertained at present:—

Amount payable under the 15th section of the Act		£789,977
Expended by the Board		17,207
Due to the Corporations for the Parliamentary expenses of 1876—		
Corporation of Stockton	£8114	
Corporation of Middlesbrough	9040	
		17,154
		£824,338
Unascertained—		
The costs of the arbitration	£—	
The statutory debts and the debts *bonâ fide* incurred, so far as these exceed £110,000	—	
	£—	

In any case the total cost can hardly be hoped to fall below £850,000.

The receipts of the Water Company for the year ending Dec. 31, 1877, were stated to have realized the sum of £41,106, excluding £802 profit on fittings, 1871 to 1877. The working expenses are set down as £11,217, leaving available for interest, &c., £29,889.

We have no reason to hope that, in the immediate future, the Board will be able materially to increase this amount except by altering the present scale of charges, which is lower than the parliamentary tariff, and by charging consumers outside the boroughs the full amount allowed by the statute, which is 25 per cent. above the charge to inhabitants of the boroughs. On the contrary, it is probable that the Water Company, for the purposes of the approaching arbitration, did all that lay in their power to increase the revenue of the undertaking in the period which elapsed from the passing of the Act of 1876 to the end of 1877. We will, however, assume that the revenue can be maintained at £29,849. If the Board borrows at 4 per cent. this sum will suffice to meet the interest on £746,225. But some provision should be made at once for the redemption of the moneys paid to the Water Company, and if we set this down at 3s. 9d. per cent., we are probably not far wrong, looking at the period over which the Board's power of redemption extends. In this case £29,849 would suffice to meet the interest and

redemption of £712,800. Even the larger of these amounts falls considerably short of the sum likely to be required by the Board, and does not even reach the amount for which precepts have been ordered to be issued.

It is not within our province to offer any suggestion to the Board as to the course which should be adopted under the circumstances. It will suffice if we point out that in the various estimates submitted to the respective Town Councils and Ratepayers it was assumed that a considerable surplus would remain after meeting all the claims for interest and redemption likely to arise against the water-works undertaking. The results of the arbitration have destroyed these hopes, and it will be for the Board to consider what steps should be taken under the altered conditions. The extraordinary depression under which the trade of the district is suffering, and which as yet shows no appearance of diminishing, cannot fail to be felt at the water-works in the shape of diminished demand for water, with an increasing proportion of uncollectable arrears.

On the motion for the adoption of the report,

Mr. BABBITT remarked that, according to this report, the Corporations were committed to an expenditure of £350,000 more than they had expected to obtain the works for. He asked the Town Clerk what would be the consequence if they now refused to complete the purchase.

The TOWN CLERK replied that the Corporations had nothing to do now except find the money; and if they did not find the money, the Water Board could find it, under the 56th section of the Act, independent of the Council. If the Water Board refused to complete the purchase, the Company could claim specific performance, and all the costs incurred would fall upon the Corporations.

Mr. GILL said he understood that the works had been offered for £550,000, which amount might have been reduced by £25,000. He wished to know who was responsible for refusing that offer.

Mr. HAMMOND suggested that the Corporations should offer the Water Company a lump sum to take back the works, and release them from their bargain.

Mr. ARCHIBALD asked what the actual cost would be before the new supply of water was taken from the Lune or the Balder, and what the Committee thought the rate per pound was likely to be.

The TOWN CLERK said, according to the Act, there were certain works which the Councils were bound to do within a limited time, but they could perhaps get an extension of time from Parliament.

Alderman TODD said he offered the Company £500,000 on behalf of the Corporations, but they asked £550,000, and he believed that £525,000 would have been accepted. It was, however, considered that if they gave that amount they would be giving £150,000 or £200,000 more than the works were worth.

Alderman BELL expressed regret that the Council did not go in for purchasing the works for £525,000 or £550,000. If they had done so, other gentlemen would have gone to the ratepayers and stated that they had given that amount for works in which the Company had only £250,000 as capital, and the cost in money expended only amounted to £336,000, and they would have been charged with giving £214,000 more for the works than they were worth.

The motion was then put and carried, and the Finance Committee were empowered to take the necessary steps to obtain the sum of £400,000 required by the precept of the Water Board.

On Friday, the 3rd inst., the report of the Water Board came before the quarterly meeting of the Stockton Corporation, when a long conversation ensued thereon.

The MAYOR, in moving the adoption of the report, said he could not congratulate the Council upon having obtained the works at a reasonable cost. He sincerely regretted that the members of the Board did not stand firm and take the responsibility of purchasing the works for £550,000. The reason they did not do so was that they were afraid the ratepayers would have said it was more than they were worth. Had they been there solely on their own responsibility, and as men of business, they would have closed the bargain at £550,000. As it was, there would be a deficiency of £1750 per annum to be made up annually by each town, which would cost a 3½d. rate. The Board must also endeavour to remove the sewage of Barnard Castle from the river. The people using the water, it was said, were consuming the sewage of some 10,000 people in that town, which was a very unpleasant thing; and the sooner they removed it the better.

Mr. SETTLE asked if any calculation had been made as to what the 25 per cent. additional charge to outsiders would produce; also whether there could not be an appeal against the decision of the Arbitrator.

The MAYOR said he thought there could be no appeal.

Alderman NELSON remarked that, in order to meet the loss of £1750 per annum, the Council had two alternatives—either to raise the price of the water or to levy a rate, which, at the least, would amount to 3½d. in the pound. So that they must begin with a rate of 3½d. if they did not raise the price of the water.

Mr. GRAHAM said, if the Corporations had acted in a business-like way when they received an offer from the Company, they would have saved £300,000. They were now committed to an expenditure of something like a million and a half of money for what? To get pure water, and they would fail to get it. He never was in favour of the scheme, and if he lived 50 years longer he never would be satisfied with it. It simply meant additional rates. That was what it practically came to.

Alderman DODDS, M.P., made a long speech, in which he traced the progress of the negotiations. He expressed his confidence that, notwithstanding the high price paid by the Corporations, in a short time, like the gas-works, the water-works would be self-supporting. In the purchase of the gas-works they were blamed for allowing the 10 per cent. to the old Company, and were told it would not be a paying concern. This had turned out the reverse, and now they had better and cheaper gas, and were making a handsome profit from the sale. He believed the water scheme would eventually become a success to the Corporations, who would have the benefit and supply of good water at a cheap rate.

After some discussion, the motion was adopted.

HULL GAS SUPPLY.—Mr. James Baynes reports that during the past month the quality of the gas sent into the east district by the Sutton, Southcoats, and Drypool Gas Company was as follows:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·94	16·23	16·63
Grains of sulphur per 100 cubic feet	—	—	14·50
Grains of ammonia per 100 cubic feet	—	—	6·66

Mean barometer and temperature in experiment-room:—Barometer, 29·81; Temperature, 54·9°.

TOTNES GAS COMPANY.—The annual meeting was held on the 6th inst. The accounts showed a balance on the year of £621, out of which the Directors recommended the carrying of £100 to the reserve-fund, the payment of a dividend of 7½ per cent. (free of income-tax) amounting to £233, and the carrying forward of the balance of £238 to next year's account. In answer to an inquiry, the Chairman (Mr. Chester) said the Directors could not tender for the supply of the public lamps so long as the Town Council insisted upon the infliction of such heavy penalties as they had done. The Contractors for lighting the lamps with oil had not signed the contract, and consequently were not liable to these penalties.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Ordinary General Meeting of the Shareholders of this Company was held at the London Offices, 30, Gracechurch Street, on Tuesday, the 7th inst.—Mr. T. HUGHES, Q.C. (Chairman of the Board of Directors), presiding.

The SECRETARY (Mr. Alfred Lass) having read the notice convening the meeting, the following report of the Directors was taken as read:—

The Directors have much pleasure in submitting to the Shareholders the accounts of the Company for the half year ending Dec. 31, 1877.

These, with the annexed report of the Engineer, to which the Directors beg to call the attention of the Shareholders, show the progress of the Company.

The Directors have to state that the profit for the half year has amounted to £1553 0s. 3d., which, with the balance brought from the last account, makes £1967 10s. 7d., and that after paying the interest on debentures, there remains an available balance of £1744 13s. 11d., out of which the Directors recommend the declaration of a dividend, for the half year ending the 31st of December last, on the preference share capital at the rate of 8 per cent. per annum, less income-tax, and on the ordinary share capital at the rate of 6 per cent. per annum, less income-tax, leaving a sum of about £700 to be carried forward to the next half year's account.

The Directors retiring by rotation are Quintin Hogg and Robert Pate Drysdale, who, being eligible, offer themselves for re-election. The retiring Auditor is James Waddell, who, being eligible, offers himself for re-election.

The dividend will be payable on and after the 1st of June next.

Engineer's Report.

Gas-Works, Georgetown, Feb. 25, 1878.

Gentlemen,—The half-yearly returns which have been forwarded will, I hope, be found correct; and the results of the half-year's working satisfactory. The several departments have been fully employed, and the demand for gas continues favourable. Coke and tar show very promising results, the latter especially. There is still a market for the sale of ammoniacal liquor. The gas-fitting department has been satisfactorily employed. During the past six months 21 houses have been fitted with 362 lights and 76 additional lights, making a total of 438; to which may be added 8 public lamps. My monthly reports and returns keep the Board fully informed upon all matters. The whole of the works and machinery are in an efficient state of repair. In conclusion, I beg to congratulate the Directors on the price at which coals have been obtained during the past half year, and to thank them for their kind attention to our local requirements.

(Signed) THOMAS B. YOUNGER, Engineer and Manager.

Balance-Sheet, Dec. 31, 1877.

Dr.				Cr.			
Share capital—				Fixed plant, mains, and services, as per last account	£34,265	1	10
6200 shares, at £5 fully paid up	£31,000	0	0	Add since expended	573	12	2½
Preference shares	2,060	0	0	Stock in hand	3,132	11	7½
Debenture bonds	6,400	0	0	Cash at bank and in hand	851	0	8½
Retort renewal-fund account	19	6	2	Bills receivable	1,250	0	0
Bad debt fund	110	15	0	Amounts owing by sundry persons	2,013	16	8
Bills payable	261	14	9				
Amounts owing to sundry persons	439	13	2				
Suspense account	50	0	0				
Profit and loss account, net revenue	1,744	13	11				
	£42,086	3	0		£42,086	3	0

Revenue Account.

Coals and bitumen	£797	13	4½	Gas and rental of meters	£3,188	8	2½
Purifying account	26	4	10	Residual products and fittings, &c.	769	11	9½
Wages account	418	1	8½				
Repair and maintenance of works and plant, &c.	198	18	7½				
Salaries	560	4	2				
Rent, rates, and taxes	58	17	1				
Directors and Auditors fees	155	5	0				
Trade and general charges	146	18	9				
Bad debts and allowances	22	7	5				
Law charges	15	8	10				
	£2,399	19	9½				
Balance carried to profit and loss, net revenue	1,553	0	3				
	£3,953	0	0½		£3,953	0	0½

Profit and Loss Account, Net Revenue.

Dividend, &c., paid to shareholders to June 30, 1877	£857	8	0	Balance brought from last account	£1,271	18	4½
Interest on loans, debentures, &c., to Dec. 31, 1877	222	16	8	Revenue account, balance brought down	1,553	0	3
Balance carried forward to next half year's account	1,744	13	11				
	£2,824	18	7		£2,824	18	7

The CHAIRMAN then moved—"That the report and accounts as submitted to the Shareholders be received and adopted." In doing so he said: There is very little to be said on them. The Shareholders will have seen that the state of the works is quite satisfactory, and that all the products are fetching good prices in the colony; but there is one remark which I have to make on the balance-sheet, lest the Shareholders should carry away too favourable an idea of the condition and prospects of the Company, and should think that the Directors have not exercised a sound discretion in limiting the dividend for the present half year to 6 per cent. The fact upon which such an inference could be drawn is that the amount of profit appears to have very largely increased during the past half year. It stands at £1744, as against £1270 in the previous half, and £821 in the half year before that; but the fact is that the whole of that increase does not represent ordinary profit, or profit which can be safely relied on in the future. The truth is that the price of coals and freights has ruled very favourably for the Company during the past half year, and, therefore, the balance of profit stands in the present sheet larger than we could fairly suppose it would do in ordinary times, and when the business of the world was in a rather more satisfactory condition than it is at present. I should think it probable, especially in the matter of freights, that the next balance-sheet will show—the next half year's dealings will show—a considerable decrease from the amount at which they stand in the half year under review. I really do not know that there is anything further that I need call the Shareholders attention to. The capital account stands almost precisely in the position in which it has stood now for some time. The only additional expense is an outlay of about £500. That is in connection with new works which have been executed at Georgetown—works of a permanent kind. The little anxiety which I believe I had to report to the Shareholders as existing on the occasion of the last half yearly meeting, with regard to the foundation of the new gasholder, has passed away, and, in fact, as I said in my opening remarks, the state of the works and the state of affairs generally is quite of a satisfactory character. Under these circumstances, the Directors have recommended a dividend of 6 per cent. on the ordinary capital of the Company, which we consider as much as we could with prudence recommend to the Shareholders, and we hope that that view will be adopted by them. Of course the usual 8 per cent. will be paid on the preference share capital. The only other business, after declaring the dividend, will be to re-elect, if the Shareholders desire to do so, the retiring Directors. Mr. Quintin Hogg's position makes him an important person in this Company, and, though he is not able to give us much active help, or much attendance at meetings of the Board, yet his name and connection are certainly very valuable, and for the sake of our

business in the colony I think it very desirable that he should be re-elected, and he is prepared to offer himself for re-election, as is also Mr. Drysdale, who is the only local Director we now have.

Captain THURBURN, a Director, formally seconded the motion, which was carried unanimously.

The CHAIRMAN moved—"That a dividend for the half year ending the 31st of December last be declared on the preference shares, at the rate of 8 per cent. per annum, less income-tax, and on the ordinary shares at the rate of six per cent. per annum, less income-tax, and that the same be payable on the 1st of June next.

The motion having been seconded and carried, the retiring Directors and Auditor were re-elected.

Mr. MORRISON moved a vote of thanks to the Chairman and the Directors for their valuable services in connection with the Company. The Chairman, he said, had adopted almost an apologetic tone for paying a 6 per cent. dividend, but he (the speaker) thought they must congratulate themselves on it being a very handsome dividend. He hoped they would continue to derive benefit from low freights and the low price of coals; and when they resumed their normal position, he thought it probable that the extension of the Company's business would enable the Directors to give the Shareholders a larger dividend than they gave that day, with which, however, he was quite satisfied, as he believed his brother Shareholders were.

Mr. BLYTH, in seconding the motion, rather differed from Mr. Morrison, and thought that the Chairman was quite right in not "crowing too loudly."

The resolution was carried unanimously.

Mr. H. P. STEPHENSON (the Deputy-Chairman), in reply, said: On behalf of the Board, I beg to return our thanks for the vote which you have given us. I believe that we are in a fairly prosperous state—of course, dependent somewhat on the circumstances of the country. The Chairman will tell you that if the "jingos" have their way, freights will go up very much, and we are therefore looking very anxiously forward to what the "jingos" will do.

The proceedings then terminated.

PARIS GAS COMPANY.

The Annual General Meeting of the above Company was held in Paris on the 28th of March, when the usual report of the Company's operations for the preceding year was presented by the Board of Direction. The report opens with a just tribute to the memory of the late esteemed President of the Company, M. Vincent du Bochet, whose death, on the 23rd of October last, was recorded, accompanied by a short biographical notice, in the JOURNAL of Nov. 13, 1877 (Vol. XXX., p. 758). It next announces the appointment of M. Frédéric Marguerite, who had acted as Vice-President of the Council since 1874, to the vacant post, and the selection of M. H. Sainte-Claire Deville, whose high scientific value is so well known, to fill the office of Vice-President. Coming then to the subject of the Company's operations, the report proceeds as follows:—

During the year 1877 the consumption of gas did not sensibly increase, but it would be an error to suppose that on that account our undertaking is no longer making progress. The real progress made in one year over the preceding is sometimes measured less by the augmentation of the consumption than by the increase in the number of consumers.

Consumption, which indicates pretty faithfully the position of affairs, is subject to temporary depressions, the effect of which we must take care not to exaggerate. What it is in the highest degree essential to prove is that our customers are increasing in numbers, and that the use of gas is becoming more general—passing more and more into the habits of the people; and in this respect the results obtained during the last few years are of such a nature as to give entire satisfaction. In fact, the increase in the number of our consumers in the three years from 1875 to 1877 amounted to 19,499; while during the two most favourable analogous periods since 1856—viz., from 1867 to 1869, and from 1872 to 1874—the increase did not exceed 14,705 in the former, and 16,193 in the latter.

It is therefore correct to say that the elements of consumption continue to multiply; that if, in 1877, they have not made themselves manifest by as great an increase in the amount of gas consumed as in 1876, they are none the less in existence, and when consumers return to their old habits an almost sudden increase in consumption will probably take place, to meet which it would be imprudent not to prepare ourselves.

These remarks were necessary in order that you might understand how indispensable it is that a fresh impulse should be given to our new works, although the quantity of gas sent out for consumption in the course of the year 1877 has not notably exceeded that of previous years.

GENERAL REVIEW OF THE COMPANY'S OPERATIONS.

Consumption of Gas.—During the year 1877 our works sent out for consumption a volume of gas equal to 191,197,228 cubic mètres (6749¼ million cubic feet), being 1,987,439 cubic mètres (about 70 million cubic feet) more than in 1876.

The day consumption, which takes place between the time for extinguishing and the time for relighting the public lamps, figures in the above total to the extent of 42,473,616 cubic mètres (1499 million cubic feet), and exceeds by 3,172,574 cubic mètres (112 million cubic feet) the corresponding amount for the year 1876.

Receipts for Gas.—The receipts from the sale of gas amount to 48,205,805 frs. (£1,928,232). These receipts may be apportioned as follows between the three districts supplied by the Company:—

	Francs.	Sterling.
In Paris	37,065,776	£1,482,631
In the environs	8,009,515	320,380
In the outskirts beyond the fortifications	3,130,514	125,221
Total	48,205,805	£1,928,232

Consumers.—The number of consumers on the 31st of December last was 124,178, exceeding by 6388, or 5·42 per cent., the number at the same date in 1876. Of these 6388 new consumers, 4425, or more than 69 per cent., are supplied from the house services, while 1963 only, or 31 per cent., are supplied direct from the mains. This comparison shows to what extent these house services assist in the development of our business.

Public Lighting.—The number of public lamps in use on the 31st of December last was as follows:—

In Paris and its environs	36,068
In the outskirts	6,418
Total	42,486

exceeding by 2306 the number in use on Dec. 31, 1876. During the year 1876 the increase amounted to only 773.

*House Services.**—When required so to do, we continue the gratuitous laying on of service-pipes in houses where we calculate that the sale of gas will afford us a suitable return for our outlay. Contrary to what has hitherto been the case, the number of services annually laid on to inhabited houses is considerably in excess of those laid on to entirely new houses.

Out of 100 house services, 87 were applied for by lodgers who intended using gas at once, and, whose consumption assured us an immediate return, for which, in the case of services laid on to new houses, we have sometimes to wait. At all events, the results obtained have more than realized the hopes we entertained respecting these additional services.

Let us leave the figures to speak for themselves. During the year 1877 we laid on 1293 house services—165 on the application of landlords, who undertook, at their own expense, to fit up a minimum of three burners in three apartments, and 1128 on the application of lodgers, who were ready to contract at once for a supply to at least the same number of burners. The number of these services, which on Dec. 31, 1873, was 5362, has doubled in four years, and on Dec. 31, 1877, had reached 10,540, distributed over 8746 houses. Now, it is estimated that there are 70,000 houses in Paris; it may therefore be judged, by a comparison of these figures, what an extensive field is still open for development.

These 10,540 house services, exclusive of branch-pipes, taps, and meters, which are subject to a special payment, cost 6,164,470 frs. (£246,579), which corresponds to an average cost of 585 frs. (£23 8s.) per service, being rather over the average of 583 frs. stated on Dec. 31, 1876, and exactly the same as that for the year 1875.

The receipts arising from the sale of gas supplied to these services in 1877 amounted to 6,183,991 frs. (£247,359), showing an increase of 794,622 frs. (£31,785), or 14 per cent., on the analogous receipts for the preceding year, which amounted to 5,389,372 frs. (£215,575).

With regard to the number of consumers supplied from the house services, on Dec. 31, 1877, it had reached 31,230, exceeding by 4425 the number at the corresponding date in 1876. During that year the number had increased by 4325.

These figures show that the use of these house services is progressing, that their utility is becoming more and more established, and that the Company obtain for the capital expended thereon a return which justifies the extension they have for some few years past given to this branch of their operations.

Principal Results of Working.—The following table, giving the results of the first 22 years working of the Company, shows that during that period the increase in the consumption of gas has amounted to 150,422,828 cubic mètres (about 5310 million cubic feet), or 369 per cent.; the average annual increase, excluding the years 1870 and 1871, having been 7,520,000 cubic mètres (about 265½ million cubic feet) in round numbers. In the past three years this annual average has been much higher, having reached 10,181,700 cubic mètres (nearly 359½ million cubic feet):—

Year.	Annual Consumption. Cubic Mètres. (1 c. m. = 35·317 c. ft.)	Annual Increase. Cubic Mètres. (1 c. m. = 35·317 c. ft.)	Annual Dividends. Francs.
1855	40,774,400	—	—
1856	47,335,475	6,561,075	40·00
1857	56,042,640	8,707,165	45·00
1858	62,159,300	6,116,660	50·00
1859	67,628,116	5,468,816	60·00
1860	75,518,922	7,890,806	70·00
1861	84,230,676	8,711,754	70·00
1862	93,076,220	8,845,544	85·00
1863	100,833,258	7,757,038	95·00
1864	109,610,003	8,776,745	105·00
1865	116,171,727	6,561,724	105·00
1866	122,334,605	6,162,878	110·00
1867	136,569,762	14,235,157	115·00
1868	138,797,811	2,228,049	120·00
1869	145,199,424	6,401,613	102·00
1870	114,476,909	30,722,520 dec.	40·50
1871	87,481,346	26,995,558 „	32·50
1872	147,668,331	60,186,985	51·00
1873	154,397,118	6,728,787	52·50
1874	160,652,202	6,255,084	55·00
1875	175,938,244	15,286,042	60·00
1876	189,209,789	13,271,545	62·00
1877	191,197,228	1,987,439	62·00

Manufacturing Power.—The manufacturing power of our works, which on Dec. 31, 1876, was 210,375,000 cubic mètres (7426½ million cubic feet), including that of the reserve plant destined to meet cases of accident, or any unexpected increase in consumption, was raised, in the course of the year 1877 to 228,500,000 cubic mètres (8066 million cubic feet), in the prospect of an augmentation of consumption equal to that of the two preceding years.

We estimate that at the end of the current year, upon the completion of the works in progress at the various stations, our manufacturing power will be equal to 236 million cubic mètres (8331 million cubic feet), and be capable of sending out for consumption, deducting reserve, 213 million cubic mètres (7519 million cubic feet), thus giving every security for next winter's supply.

Canalisation.—During the past year our mains have been extended by 55,007 mètres, apportioned as follows:—

	Mètres.	Yards.
In Paris and its environs	25,382	27,751
In the outskirts	29,625	32,390
Total	55,007	60,141

Or about 34 miles. We have also increased the diameter of our mains over a total length of 2425 mètres (2651 yards). Consequently, the total length of mains laid under the public roadways has been increased from 1,704,245 mètres to 1,759,252 mètres, apportioned as follows:—

	Mètres.	Yards.
In Paris and its environs	1,252,312	1,369,194
In the outskirts	506,940	554,254
Total	1,759,252	1,923,448

Or nearly 1100 miles. As usual, the greater portion of the main-laying work was done either at the request of the Municipal Authorities, or in the performance of our contracts with the various communes; the remainder was undertaken by the Company with the view of meeting certain demands of private lighting which appeared advantageous.

We have recently negotiated with the commune of Ville-d'Avray a lighting contract, which is now awaiting the approval of the *Administration Supérieure*. The conditions of this contract are exactly the same as those contained in contracts already entered into with many other communes, and like them will expire with our concession on Dec. 31, 1905. When this contract comes into operation, the number of communes lighted by the Company, in the departments of the Seine and Seine-et-Oise, will be fifty-one.

[The report then refers to the settlement in the Company's favour of certain long-standing difficulties between them and the communes of Neuilly and St. Mandé relative to the payment of *octroi* duties on the coals consumed at the Company's stations in those communes, to which, under the Company's treaty of 1857, the Communal Authorities claimed to

* These house services, called *conduites montantes*, are pipes carried from the bottom to the top of the buildings, for the supply of flats and separate apartments, as in Scotland.

be entitled, although the ground on which the works stand has since 1859 formed part of the City of Paris. The case was heard first by the Conseil de Préfecture, who decided in the Company's favour, and this decision was subsequently confirmed by the Conseil d'Etat.]

EXPENSES OF FIRST ESTABLISHMENT.

You are aware that these expenses are incurred, on the one hand, with the object of extending our mains and services—that is to say, doing whatever may contribute to the progress of the Company—and, on the other, the carrying out, at our various stations, of the necessary works for rendering our manufacturing power equal to the requirements of the consumption. The fact of being compelled each year to sink fresh capital in extensions is a proof of the daily growth of our Company, and when this ceases to be the case we shall have attained the limit of our progress.

Do not alarm yourselves, however. Our industry is in the plenitude of its development; its domain is continually extending. Gas presents advantages that are quite its own; it may be employed equally well for lighting, for heating, and for the production of motive power; and all the inventions having for their object the substitution of painfully brilliant lights, of complicated installation, for the soft, easily managed, and indefinitely divisible light of gas, will in no way diminish the constantly increasing number of our consumers.

During the year 1877, we, in a great measure, finished the works in progress at our stations at La Villette and Ivry, where the productive power has been considerably augmented; we are, therefore, in a position to devote the whole of our care and attention to the new works at Clichy, of which the foundations have just been laid. These works will cover an area of 17 hectares (42 acres), and will be equal to an annual production of 75 million cubic mètres (2647 million cubic feet). We intend constructing these works in portions, and gradually developing them in proportion to the requirements of consumption, and we shall, of course, introduce all the improvements which have been proved by long experience to be suitable and efficacious.

The total amount expended on works of first establishment during the year 1877 was 7,836,057 frs. (£313,442), apportioned as follows:—

ACCOUNT OF EXPENSES OF FIRST ESTABLISHMENT FOR THE YEAR 1877.

Expended in the Purchase of Land, &c.

	Francs.	Sterling.
Land acquired for the extension of coal stores at La Villette	125,025	£5,001
Plot of ground at Ivry	9,815	392
Property acquired for the extension of the coke store at Ivry	54,759	2,190
Land acquired for the construction of a branch line between the St. Mandé station and the Ceinture Railway	17,500	700
Property acquired for do.	31,300	1,252
Sundry plots of ground acquired for enlarging the coal and coke yards at Boulogne (Paris)	32,400	1,296
Legal and other expenses in connection with above	75,285	3,012
	346,084	£13,843
Less value of land at La Villette, transferred to the Chemin de Fer de l'Est	249,611	9,984
Total	96,473	£3,859

Expended on Works and Plant.

La Villette.—Completion of three gasholders, each of 15,000 cubic mètres (530,000 cubic feet) capacity; do. of two gasholder-tanks; inlet and outlet mains; completion of two settings of eight through retorts, begun in 1876; battery condensers; new 20-horse power engine for working the pumps	1,570,098	£62,804
Les Ternes.—Completion of gasholder of 20,000 cubic mètres (706,000 cubic feet) capacity; new valve-house and water reservoir; completion of pipe condenser	133,370	5,335
Passy.—Completion of telescopic gasholder of 8500 cubic mètres (300,000 cubic feet) capacity	51,941	2,077
Vaugirard.—Enlargement of coke-crusher; completion of gasholder of 15,000 cubic mètres capacity; additional station-meter; extension of horizontal condensers	100,182	4,007
Ivry.—Completion of two gasholders, each of 20,000 cubic mètres capacity; do. of four settings of eight through retorts, with Siemens's generators; erection of two additional retort-settings, similar to preceding; three exhausters, with governor; three steam-boilers, each of 22-horse power; four station-meters, capable of passing 40,000 cubic mètres (1,412,000 cubic feet) per 24 hours; tar-wells and well borings; purifying-house, containing 24 purifiers; coke-crusher; completion of stable for 90 horses; consolidation of subsoil and foundations	2,117,789	84,711
Belleville.—Conversion of two ordinary retort-settings into Siemens's ovens; new station-meter capable of passing 300,000 cubic mètres (1,000,000 cubic feet) in 24 hours	31,320	1,253
St. Mandé.—Completion of a second coke-crusher and two sets of ten purifiers, with revivifying sheds; paving work	129,841	5,194
Boulogne.—Completion of pipe condenser; gas-engine for working coke-crusher; station-meter; battery condenser	33,952	1,358
Maisons-Alfort.—Raising level of yards; heightening a setting of three through retorts; gas-engine for working tar and liquor pumps	32,845	1,314
Clichy.—Banking up soil of works; boundary and other walls; cranes and lines of rails for the transport and discharge of material; excavations for three gasholder-tanks	537,623	21,505
Tar-Works at La Villette.—Setting of six new coppers for the distillation of tar; two steam generators, and a pitch machine	66,819	2,673
Works for the Treatment of Chemical Products.—Two apparatus for the distillation of ammoniacal liquor; sheds for stacking sulphate of ammonia casks; pump and reservoir	78,234	3,129
Sundry works at the other stations of the Company	62,594	2,504
Total	4,946,608	£197,864

Expended on Mains, Services, Fittings, &c.

	Francs.	Sterling.
Main-laying.—New mains laid during the year, and replacing old mains by others of larger diameter	1,096,657	£43,866
House Services.—Expenses of laying on, including premiums	769,503	30,780
Branch-pipes and Fittings.—Construction of fittings, &c., let out on hire during the year 1877	337,527	13,501
Meters.—Purchase of meters let out on hire	304,898	12,196
Vehicles.—Increase in the number of horses and vehicles for the conveyance of coal, coke, tar, ammoniacal liquor, &c.	119,700	4,788
Tools and Material.—General increase in stock	50,929	2,037
Establishment Expenses.—Miscellaneous payments	113,762	4,551
Total	2,792,976	£111,719
Total expenses of first establishment	7,836,057	£313,442

The general position of the account of expenses of first establishment may be thus stated:—

	Francs.	Sterling.
Amount expended to Dec. 31, 1876	162,024,390	£6,480,975
Ditto during 1877	7,836,057	313,442
Total on Dec. 31, 1877	169,860,447	£6,794,417
To meet which there is a capital of—		
In shares 84,000,000 frs.		
In bonds 85,145,739 frs.	169,145,739*	£6,765,829
Balance against the Company	714,708	£28,588

Loan of 1875.—The loan of 25,226,080 frs. (£1,009,044), which you authorized us to contract in 1875, in order to liquidate the expenses of first establishment incurred up to Dec. 31, 1874, and to raise the annual manufacturing power of our works by 40 million cubic mètres (1412 million cubic feet), has been appropriated, for works carried out during the year 1875 and following years, to the extent of 23,216,000 frs., apportioned as follows:—

	Francs.	Sterling.
Purchase of land and extension of works	13,316,000	£532,640
Main-laying	3,260,000	130,400
House services, fittings, and meters on hire, tools, &c.	6,640,000	265,600
Total	23,216,000	£928,640

The amount expended out of this sum during the years 1875, 1876, and 1877 reached a total of 23,930,708 frs., apportioned as follows:—

	Francs.	Sterling.
Purchase of land and extension of works	13,970,190	£558,808
Main-laying	3,533,755	141,350
House services, fittings, and meters on hire, tools, &c.	6,426,754	257,070
Total	23,930,708	£957,228

The expenses incurred have, therefore, exceeded the estimated expenses by 714,708 frs. (£28,588). This excess is due principally to the purchases of land, of which we gave you the particulars at our last meeting, and which we were able to effect under exceptionally advantageous circumstances. We shall now be enabled to increase the works at Clichy by one-half more than we originally intended, double the power of the tar-works at La Villette, and secure the coke service at Vaugirard and Ivry. These acquisitions not being included among the works for the execution of which the loan of 1875 was raised, are less an augmentation of the estimated expenses than a useful and necessary addition to them, and the outlay thus incurred will lessen by so much the amount to be raised by future loans.

We need not add that these purchases have not in any way prejudiced the works specially provided for by the loan of 1875. In fact, owing to the economy exercised in carrying out those works, our manufacturing power exceeds by 3½ million cubic mètres (123½ million cubic feet), the figure to which, by the aid of this loan, we were to be enabled to raise it.

This year, as in 1875 and 1876, the total of our expenses of first establishment exceeds the amount of our realized resources. This circumstance has not, however, appeared to us to necessitate any alteration in the conditions of payment of the current loan; on the contrary, we have thought it advisable not to call up, in anticipation, money on which 5 per cent. would have to be paid, when we had capital in hand that would be liable to only a very trifling interest.

WORKING ACCOUNT FOR THE YEAR 1877.

EXPENDITURE.

	Francs.	Sterling.
Value of gas in store on Jan. 1, 1877	26,642	£1,065
Materials used in Manufacture.		
Coals carbonized	17,042,696	£681,708
Coke and tar for heating purposes	3,316,402	132,656
	20,359,098	£814,364
Manufacturing Charges.		
Salaries and wages	2,312,749	£92,510
Maintenance of works and plant	1,490,595	59,624
Incidental expenses of distillation	1,038,174	41,527
Purifying material	268,968	10,759
General expenses	71,294	2,852
	5,181,780	£207,272
Cost of Distribution.		
Salaries of Engineers and Officers	999,642	£39,986
Repair and maintenance of mains and service-pipes	501,430	20,057
Allowances, premiums, &c.	11,764	470
Printing and advertising	117,276	4,691
Miscellaneous	50,416	2,017
	1,680,528	£67,221

* It follows from an examination of the balance-sheet that out of a capital of 169,145,739 frs. there had been paid off, on Dec. 31 last, in shares, 6,716,500 frs.; in bonds, 7,226,142 frs.; total, 13,942,642 frs.; leaving 155,203,097 frs. still to be redeemed.

General Management.	Francs.	Sterling.
Board of Direction	80,000	£3,200
Executive Committee	70,000	2,800
Salaries	715,051	28,602
Office and other expenses	134,313	5,373
Service, accidents, relief, &c.	144,375	5,775
Law and other charges	12,988	519
Rents and insurances	76,232	3,049
Interest on loans	4,514,307	180,572
Loan redemption-fund	1,100,000	44,000
Share ditto	1,260,250	50,410
Cost of experiments, &c.	26,953	1,078
Pension-fund	85,500	3,420
Provident-fund	102,767	4,111
	8,322,736	£332,909
Municipal Charges.		
Tax of ·02 c. per cubic mètre of gas	3,309,478	£132,379
Rating of subsoil	200,000	8,000
Lighting, extinguishing, and maintenance of public lamps	457,735	18,309
	3,967,213	£158,688
State Charges.		
Taxes	421,700	£16,868
Stamps	108,870	4,355
Subsidy to Control Department	8,000	320
	538,570	£21,543
Total Expenditure.	40,076,567	£1,603,062
REVENUE.		
Produce of the sale of gas	48,205,806	£1,928,232
Value of gas in store on Jan. 1, 1877	25,925	1,037
Retort coke	14,253,555	570,142
Furnace coke	547,948	21,918
Tar	2,024,064	80,963
Ammoniacal liquor	313,206	12,528
Rent of meters on hire	1,031,029	41,241
Ditto of fittings, &c., ditto	1,020,677	40,827
Fire-bricks	245,600	9,824
Chemical products	961,046	38,442
Sundry works	114,168	4,567
Interests and discounts	360,760	14,430
Total Revenue	69,103,784	£2,764,151
Balance in favour of revenue, being profit made during 1877	29,027,217	£1,161,088
Add balance of profit from 1876	130,149	5,206
	29,157,366	£1,166,294
Deduct reserve to meet claims outstanding on Dec. 31, 1877	57,366	2,294
Balance, being profit available for distribution.	29,100,000	£1,164,000
Deduct for share dividend	12,400,000	496,000
Balance divisible equally between the Municipality of Paris and the Gas Company	16,700,000	668,000

The total amount available for distribution among the Shareholders is, therefore, as follows:—

	Francs.	Sterling.
Dividend, as per above account	12,400,000	£496,000
Moiety of balance, ditto	8,350,000	334,000
Fifth payment by the Municipality of Paris	50,000	2,000
Balance of profit from 1876	193,824	7,752
Total	20,993,824	£839,752
Deduct 1 fr. per share for special reserve-fund, authorized at the general meeting on March 23, 1875	336,000	13,440
Balance	20,657,824	£826,312
Deduct first dividend of 12 frs. 50 c. paid in October last	3,927,187	157,087
	16,730,637	£669,225
Deduct final dividend of 49 frs. 50 c., making a total dividend for the year of 62 frs. per share (250 frs.)	16,632,000	665,280
Net balance to carry forward	98,637	£3,945

PROVIDENT AND OTHER FUNDS.

Provident-Fund.—During the year 1877 the medical staff visited, at their homes, 1317 of the Company's servants, and attended 21,526 consultations. The medical fees, medicine, baths and instruments, half salaries to the workmen and other servants of the Company who are unable to discharge their duties on account of sickness, and funeral expenses, caused an expenditure of 210,640 frs. The account of this fund stands as follows:—

Expenditure.	Francs.	Sterling.
Medical fees, medicine, &c., as above	210,640	£8,425
Receipts.		
One per cent. deducted from salaries, &c.	102,769	£4,110
Equal amount given by the Company	102,769	4,110
Interest and sundry receipts	9,752	390
Total	215,290	£8,611
Excess of receipts	4,650	£186

In the preceding year, on the contrary, the expenses exceeded the receipts by 25,129 frs. (£1005).

On the 31st of December last this fund possessed 157 of the Company's fully-paid bonds; the Company were, however, at the same time, indebted to the fund in a sum of 46,488 frs. (£1859), which reduced the balance to its credit to 33,320 frs. (£1332). At the corresponding date in 1876 this credit balance stood at 28,670 frs. (£1147).

Pension-Fund.—The amount set apart for this fund, which, by your decision of March 23, 1875, was raised from 25,500 frs. to 85,500 frs. (£1020 to £3420), has been further augmented this year by the sum of 100,000 frs. (£4000), for which we are indebted to the generosity of the heirs of the late M. Du Bochet.

The amount placed to the credit of the fund since its formation, including interest and balance realized upon the last drawing of bonds, reached on Dec. 31, 1877, a total of 1,589,691 frs., represented by—

	Francs.	Sterling.
Bonds partly paid up (3131)	1,367,443	£54,697
Balance in hand	222,248	8,890
Total	1,589,691	£63,587

The disposable balance, augmented by the grant made to the fund for the first quarter of the year 1878, will be employed in paying off the fourth instalment on 1368 bonds not fully paid up, and in the purchase of fresh securities. Supposing that these can be purchased at about par, it will be seen that the revenue of the pension-fund will, at the end of the year, amount to about 80,000 frs. (£3200), after deducting tax.

The deduction of 4500 frs. made each year from the amount placed to the credit of this fund, in conformity with the rule, for the purpose of assisting those of the Company's servants who have become incapable of performing their duties, but who have no claim upon the fund, has not been sufficient. We have, therefore, had to subsidize it to the extent of 62,488 frs. (£2499), forming a total of 66,988 frs. (£2678), of which 15,588 frs. (£623) are for pensions, and 51,399 frs. (£2055) are for assistance, renewable every year. Last year this subsidy amounted to 56,502 frs. (£2260).

Savings-Fund.—This fund, as you are aware, is of recent origin; it dates from the 1st of July, 1876. Our object in establishing it was to inspire habits of thriftiness in our workmen and servants, and afford them facilities for putting away, without expense or loss of time, whatever money they might be able to save each month out of their earnings. The deposits are entered in a small book in the name of the depositor, and bear interest at the rate of 5 per cent. per annum. When the sums deposited amount to 500 frs., the Company undertake, with the depositor's consent, and free of charge, to invest the same in their own bonds, or in railway or other stocks, for which vouchers are given to such depositor. The operations of this fund may be summarized as follows:—

	Francs.		Sterling.
Since July 1, 1876, there have been 2705 accounts opened, the amount received on deposit having been		322,185	£12,887
Out of this sum there has been repaid—			
In cash to 969 depositors, 352 of whom have left the Company's service	74,511 frs.		
In vouchers to 88 depositors whose deposits exceeded 500 frs.	41,504 frs.		
		116,015	4,640
Balance in hand on Dec. 31, 1877		206,170	£8,247

Adding this sum to the amount of the vouchers delivered, we obtain a total of 247,674 frs. (£9907), which represents the amount saved by the Company's servants in the course of 18 months.

Special Reserve-Fund.—This fund, which was instituted in conformity with Article 40 of the Statutes, is augmented each year by means of a levy of one franc per share upon the Shareholders profits, to which is added the annuity of 210,296 frs. (£8412) due to the Company by the Municipality of Paris, in execution of Article 4 of the treaty of April 27, 1872. The position of this fund on Dec. 31 last was as follows:—

	Francs.	Sterling.
Amount paid into fund	1,344,000	£53,760
Interest	123,064	4,922
Deferred annuities of the City of Paris, capital and interest	1,162,570	46,502
Total	2,629,634	£105,184

The first two amounts are represented by 3176 of the Company's bonds, paid up to the extent of 400 frs., having cost 1,149,242 frs. (£45,969), and by a balance in hand of 317,822 frs. (£12,713), which will be applied in paying off the fourth instalment on these bonds, due on the 6th of April.

LABOUR, MATERIALS, RESIDUALS, ETC.

Labour.—During the year 1877 the price of labour remained stationary. Owing to our having, in 1876, granted an increased rate of pay, and certain other privileges, to our workmen and servants, we experience no difficulty in filling up any vacancies that may occur, and we have only had to congratulate ourselves on the order and discipline that have constantly prevailed at our several stations.

Coal.—Several coal contracts entered into in 1872, when prices were high, expired last year. We informed you at our last meeting that we had renewed these contracts on favourable conditions, and we shall therefore be able to count upon a considerable improvement under this head in the course of the present year, if coke, of which the price is regulated by that of coal, does not sustain a nearly equivalent depreciation.

Retort Coke.—Although in the year 1877 we produced only 38,547 hectolitres (2965 chaldrons of 36 bushels) of coke more than in 1876, our stock on the 31st of December last exceeded by 1,726,428 hectolitres (132,802 chaldrons) that on the same date in the preceding year. This falling off in the sale of coke is the very natural consequence of the exceptional mildness of the past two winters. It in no way implies the abandonment of this combustible for industrial and domestic purposes, as, during a few cold days in the month of January, 1878, our coke sales exceeded the production by more than 100,000 hectolitres (7692 chaldrons). We estimate that two ordinary winters will suffice to enable us to clear off this superabundance of coke.

The produce from the sale of coke, which in 1876 reached 14,999,028 frs. (£599,961), amounted to only 14,253,555 frs. (£570,142), showing a diminution of 745,473 frs. (£29,819), or very nearly equal to the amount saved on the coal.

This result furnishes us with a fresh example of the compensatory part played by coke in our industry, in mitigating to a very considerable extent the effects of fluctuations in the price of coal.

With regard to the produce of the manufacture of metallurgic coke, this produced 547,947 frs. (£21,917), exceeding by 15,939 frs. (£637) the amount realized in the preceding year.

Heating Apparatus.—In the course of the year 1877 we sold 1471 apparatus for heating by coke, being 810 less than in 1876; this brings the number of apparatus sent out from our works up to 44,523, the whole of which are now, so to speak, in operation in Paris.

Tar and Chemical Products.—The quantity of tar and ammoniacal liquor produced at the various stations of the Company now exceeds 100,000 tons per annum. We continue to bestow a considerable amount of care on the treatment of these secondary products, which it would be impossible to sell directly, and which we work up into a certain number of commercial products suitable to various requirements. The net produce of this manufacture in 1876 was as follows:—

	Francs.	Sterling.
Treatment of tar	2,567,901	£102,716
Treatment of ammoniacal liquor	930,008	37,200
Total	3,497,909	£139,916

Last year the figures were—

	Francs.	Sterling.
Treatment of tar	2,024,064	£80,962
Treatment of ammoniacal liquor	961,046	38,442
Total	2,985,110	£119,404

Showing a decrease of 512,799 frs. (£20,512). This diminution of profit is solely due to the depreciation of one of the products of the distillation of tar—viz., anthracene, which is employed in the manufacture of artificial alizarine. The principal markets for this latter product are in the East, where it is used for dyeing purposes; but there is now no sale for it. Events have disturbed the equilibrium that existed between the production and the consumption, and the glutted state of the market has been quickly followed by a fall of 70 per cent. in the selling price. However, all our production for the next two years is sold, and on relatively advantageous conditions.

Gas-Engines.—The use of these engines in minor industrial operations continues to extend. During the year 1877 we sold five horizontal engines on Lenoir's system, and 37 of Otto and Langen's vertical engines; making a total number of 769 engines on both systems that have left our works in the course of 15 years. The number of gas-engines in operation in Paris on the 31st of December last was 257, of which 129 were horizontal, and 128 vertical, representing altogether a motive power equal to 340 horses. It is estimated that the quantity of gas consumed by these machines during the past year was 897,000 cubic mètres (31,664,000 cubic feet).

We are at present engaged on the construction of a new gas-engine, recently invented by M. Otto, which seems to solve more satisfactorily than its predecessors have done, the problem of the application of gas to the production of motive power.

NEW LOAN.

The report concludes by stating that, owing to the unexpected increase in the consumption of gas during the past three years, the Directors anticipate that the limit of the productive power of their works will be attained somewhat earlier than they contemplated at the time the loan of 1875 was raised. They estimate that in the year 1881 the consumption of gas will be about 240 million cubic mètres (8472 million cubic feet) per annum, and, in order to be prepared to meet this great demand upon their resources, the manufacturing power of the several stations, including the plant in reserve, should be raised, in the course of the forthcoming four years, to 261 million cubic mètres (9213 million cubic feet), or 32½ million cubic mètres (1147½ million cubic feet) in excess of the power attained on the 31st of December last.

The total amount required for carrying out these extensions, as well as for proportionately increasing the mains, house services, number of meters, &c., is estimated at 26,600,000 frs. (£1,064,000). This sum the Directors propose to raise by the issue of 56,000 bonds of 500 frs., repayable at par, by means of a sinking-fund, in 25 yearly payments, from Jan. 1, 1882, to the end of the Company's concession on Dec. 31, 1905. These bonds will be issued at 475 frs., payable in four instalments, and half-yearly coupons will be attached, bearing interest ranging from 12 frs. 50 c. to 25 frs. per annum. The bonds will be offered exclusively to Shareholders in the Company, and will be allotted in proportion to the number of shares held.

GAS AFFAIRS AT READING.

At the Quarterly Meeting of the Reading Town Council, on Thursday, May 2—the MAYOR (Mr. J. Silver) presiding—the following report of the Gas Committee was submitted:—

In consequence of the resolution passed at the Council on the 4th of April, on the subject of the arrangements for testing the purity of the gas, this Committee, at a meeting on the 23rd ult., considered the matter, and resolved—"That in the opinion of the Committee it is not possible to make satisfactory arrangements for the testing of the illuminating power of the gas by the Borough Analyst until this work can be performed in the Analyst's laboratory in the municipal buildings, and that the Committee do therefore recommend to the Council that the resolutions adopted by the Committee at their last meeting on the subject of the purity of the gas be approved, adopted, and confirmed by the Council."

The Gas Inspector (Mr. R. F. Hart) reported that the public lamps were in a satisfactory condition. He had sent a list of 294 lamps to the Gas Company which might be stopped off for the summer, leaving 406 to light, and 56 extra summer lamps to be charged for. New lamps would be required in Mundesley Street, Essex Street, Whitley, and in another new street on the Redlands Estate. He had tested the illuminating power of the gas four times during the month, with the following results:—March 29, 12·71; April 3, 13·33; April 9, 13·46; April 17, 13·45; the minimum standard being 12 sperm candles,

Alderman HEWETT, in moving the adoption of the report, said it was something rather novel now for the gas question to take up their time, though some years ago it was one of the most exciting subjects they had. About 1863 an alteration was made by the introduction of meters, which were tried for about five years; they involved a great deal of trouble, and the results were not satisfactory. Since then they had gone on very comfortably, and there had been no complaint; the Company had carried out their contract, and he considered they had a very able and efficient officer in Mr. Hart. The Committee, when they met the other day, did not consider that the Corporation would gain anything whatever by the alteration sugested at the last Council as to testing the illuminating power of the gas. As Dr. Shea could not do that testing at his own laboratory, they proposed that their previous resolution should now be confirmed. Dr. Shea offered to test the purity of the gas periodically, and the Committee were sure it would be well done.

Mr. HOUNSLOW seconded the motion.

Mr. KING wished to move as an amendment—"That no arrangement for testing the gas can be satisfactory that does not combine the test for purity with that for illuminating power, and that the duty would be best performed by the Borough Analyst; and that to secure due economy the general superintendence of the lighting be placed under the Borough Surveyor." He said he had made inquiry, and was unable to find any town in England with similar arrangements. In all the towns from which he had heard, testing for illuminating power and superintending the public lighting were performed by the Borough Surveyor, except at Bristol, where the officer who tested the gas-meters tested the illuminating power and the purity of the gas as well. That was unduly multiplying officers, and was calculated to entail more expenditure than the performance of those duties really necessitated. About June, 1862, the Local Board determined as Mr. Hewett had said, to burn gas by meter, and in May of the following year, with a view of carrying that arrangement to perfection, the late Mr. Samuel Hughes suggested the appointment of a competent person to "take" the meters with the Gas Company's officer. The meters answered the purpose of enabling the Gas Company and the Corporation to arrive at a just and fair sum to be charged per lamp. In November, 1865, the duties of the Inspector were defined by a resolution of the Council as being to test the illuminating power of the gas, and its purity; but the latter had never been done, because an ordinary gas-fitter was unable to carry out a chemical test. That appointment was made, in connection with taking the meters, testing the purity, and generally superintending the lighting of the borough, at £77 16s. per annum. In 1867, a contract was entered into with the Company to light the lamps at £2 7s. 6d. each, which effected a saving to the ratepayers of nearly £1 per lamp. At that period the meter system had practically come to an end, and with the end of the system came the time when the appointment of a special officer to superintend the lighting of the borough should end. About February, 1868, he found that the Inspector had to ask for instructions as to whether he should continue in his office, and, if so, what his duties would be, and he was instructed to go on testing the illuminating power of the gas, and generally superintending the lighting of the borough. He believed if they combined the two kinds of testing in Dr. Shea, it could be done for about £20 a year, and he felt that the superintendence of the lighting should be transferred to the Borough Surveyor. He had every confidence in the intention of the Gas Company to do what was honest and fair, if not more; and felt there was very little need of supervision and check upon them.

Mr. BEALE seconded the amendment, feeling that the only way to have gas of proper purity was to leave it in the hands of a competent individual like Dr. Shea; and that the offices should be concentrated.

Alderman PALMER heartily agreed with the principle underlying Mr. King's proposition—that it was desirable to concentrate all their work in the hands of well-known and responsible officers; but did not think in practice the amendment would effect a saving. He felt they had better refer the matter back to the Committee.

Mr. BEAIN said he had come prepared to move a resolution similar in effect to the amendment of Mr. King, but had put it aside in favour of Mr. King's. The *non possumus* of the Committee seemed to him an admission that what they were asked at the last Council to do was right, but that they would not do it. The Committee's resolution showed, however, that when the necessary arrangements had been made the illuminating power of the gas could be tested in those buildings without any trouble; and he said let it be done at once. He thought the Committee had hardly done justice to the Council, who unanimously referred the matter back to them last month. They were only making offices for men, instead of trying to concentrate them. To inspect the lamps was the duty of the Surveyor, with the assistance of the police; and then the lamps would not be so dirty as some he had noticed in the Oxford Road.

The TOWN CLERK, having explained that the amendment proposed by Mr. King was informal, and would upset all the Committee's report if carried, read the following, which was accepted by Mr. King in lieu of his own amendment:—"That the resolutions and proceedings of the Public Lights and Gas Committee be approved, adopted, and confirmed by the Council, except the resolution which proposes arrangements for testing the purity of the gas; and that in the opinion of this Council no arrangement for testing gas can be satisfactory which does not combine the test for purity with that of illuminating power, and that this duty should be performed by the Borough Analyst; and that to ensure due economy, the general superintendence of lighting should be placed under the Borough Surveyor; and that the Public Lights and Gas Committee be requested to take steps for carrying out such arrangements."

Alderman MORRIS suppported the amendment, on the ground that when the arrangement was made with Mr. Hart many years since, the duties were very different to what they now were. He hoped Alderman Hewett would accept the amendment; and if the Gas Committee would forget Mr. Hart, they would arrive at a satisfactory conclusion.

Alderman DARTER said if the Council chose, they could have reports, as to any irregularity in the lamps, from the police, by whom every lamp in the borough was seen every day. That was, he thought, the proper way of getting information as to the state of the town in all respects; no other plan could be so effective or cheap.

Mr. COLEBROOK did not think the care of the lamps would much increase the Surveyor's duties if the police assisted him.

Mr. BLANDY felt that as long as they had officers who did their work well they should not be removed without some reason being shown. Though he admitted to a certain extent the strength of what Alderman Palmer had said, he did not see that any of the gentlemen who had spoken in favour of the amendment had shown that the work had been done badly in the past, or had given any reason why the arrangement proposed by the Committee should not be carried out. After all, the proposal was of a temporary character, and it would be easy to concentrate the work when they had the new buildings. By entrusting the supervision of the lamps to the police, they would greatly divide the responsibility, and Mr. Parry already had his hands tolerably full.

The MAYOR strongly supported the Committee.

Alderman HEWETT, in reply, said the duties connected with superintending the gas were more onerous than many people supposed. Mr. Hart had performed them extremely well, and he failed to see that the change proposed would be of any benefit.

The amendment was then put, and, on a division, was lost, 7 voting for it and 10 against it.

Alderman PALMER then proposed, as a further amendment, that the suggestions contained in Mr. King's resolution should be referred to the Gas Committee with a view to their reconsideration of the matter.

The EX-MAYOR seconded the amendment, which was carried, after some discussion, 10 voting for it.

DEATH OF Mr. W. CLARKE WATSON.—A correspondent informs us of the death of this gentleman on the 6th inst., at the age of 40 years. Mr. Watson's first appointment as Gas Manager was in Ireland. He afterwards removed to Hexham, and had charge of the gas-works there, until an appointment was offered him to superintend the construction and subsequently the managership of works in Sardinia. He remained there some years, and then returned to England, and held the post of Engineer and Manager of the Kingston-on-Thames Gas-Works. The offer of a lucrative appointment induced him again to go abroad, but unfortunately failing health and temporary loss of eyesight necessitated his return to England, after eighteen months residence in the tropics. Mr. Watson enjoyed the esteem of a wide circle of friends.

INSTITUTION OF CIVIL ENGINEERS.—At the meeting of this Society on Tuesday, May 7—Mr. J. F. Bateman, F.R.S., President, in the chair—it was announced that the Council have transferred Messrs. Thornton Andrews, C. O. Burge, H. P. Boulnois, Charles Copland, F. E. Duckham, R. G. Elwes, Richard Hodson, H. G. C. Ketchum, John Lawson, J. B. Mackenzie, Wm. M'Landsborough, Frank Morris, Thos. Newbigging, R. T. Smith, and A. H. Whipham from the class of *Associates* to that of *Members*; and had admitted Messrs. Charles Henry Ashforth, Arthur Horatio Brothers, Alfred Alexander Begnigno Chester, Frederick Richard Clapham, James Gillespie Clow, John Charles Lang, Charles Arthur Lovegrove, Percy Rickard, Edgar Smart, James Hardy Southern, James Naaman Taylor, and Maurice FitzGerald Wilson as *Students*. At the monthly ballot Mr. H. Rofe, Resident Engineer to the Nottingham Water Company, was elected a *Member*, and Messrs. Edwin Addenbrooke, Gas Examiner for the Commercial Gas Company's District; Frank Baker, Sheffield Water Company; and J. B. Ball, Engineer and Manager of the Loughborough Gas-Works, were (with others) elected as *Associates*.

NORTH OF ENGLAND GAS MANAGERS ASSOCIATION.

The second and final Meeting of this Association for the Session 1877-78 was held on Saturday, April 27th, in the Board-room of the Newcastle and Gateshead Gas Company, Neville Street, Newcastle-on-Tyne—Mr. W. J. WARNER, of South Shields, President of the Association, in the chair.

The minutes of the last meeting, together with the financial statement—which showed a balance of £17 7s. 2d. in hand—both of which had been printed and circulated among the members, were taken as read, and adopted by the meeting.

The following new Members were elected:—

Bruce, Graham	Gas-Works, South Shields.
Hardie, Wm., jun.	„ Redheugh.

The following Associates were elected:—

Davidson, J.	Dawsholm Gas-Works, Glasgow.
Smith, W. W.	Newcastle.
Stewart, A.	Glasgow.
Turner, Joseph	Gateshead.

The President then delivered his Address as follows:—

Gentlemen,—By the special nature of the business of our first meeting, I was precluded from addressing you in general terms, as is usual with those occupying similar positions of honour to that in which I have been placed by your kindness.

Allow me to offer you my congratulations on the successful issue of that first meeting—in the large number of Members and Associates who joined us, in the broad and comprehensive nature of the rules which you adopted, in having the right of *entrée* into modern works of so extensive a character as those of the Redheugh station of the Newcastle and Gateshead Gas Company, and in the very warm reception you met with and the generous way you were entertained by the Chairman (Mr. Hedley) and the Directors of the Company.

To return to our rules: "The object of this Association shall be the advancement of gas engineering, and the encouragement of discussion of all matters connected with the manufacture and distribution of gas and its products." This is the basis upon which our Association is placed, and on it is inscribed the threefold nature of our pursuits—professional knowledge, technicalities of manufacture, and the enterprise of trade. It is for the advancement of these that we are banded together. This is the sole object. No benefit can accrue to any Member or Associate but that flowing from an interchange of observations, experience, and opinions. In a professional sense, we are, then, a Mutual Benefit Society, and as members of it we are morally bound to promote the object of the Association, and to further its purpose. The book of our common professional life is now opened, with clear, unsullied pages, for your transactions to be recorded; let them be worthy of your profession and the great interests committed to your care, and they will then be worthy of yourselves.

As the advancement of our profession, in our associated condition, must come chiefly through the contribution of papers, it is desirable that these should aim at excellency.

Whether practical or speculative, I would not, however, be desirous of producing papers only for the purpose of provoking discussion. I do not hold the opinion of some, that these are the most useful, though often most acceptable. Upon common subjects common opinions are held, and freely given expression to; but does the expression of such opinions increase our common stock of knowledge? Are we mentally nourished and improved? I think not. Occasionally, useful hints may be thrown out and suggestions made, but if this be all that can be got from a paper communicated to a scientific body of men, such a paper must be pronounced a failure. Every paper delivered to an Association such as ours should be a communication in its widest sense—should convey a fact or develope an idea. This, it may be advanced, raises the standard too high, and will cause a dearth of papers. I hope not, as papers are as valuable to those who prepare as to those who receive them. My object is not to lessen the quantity, but to raise the quality to the highest excellency, as only by such communications can the object of the Association be attained—the advancement of gas engineering. The expression of ill-digested opinions can in no way advance our position, or improve our condition, either individually or collectively. Perfect essays upon abstruse subjects, or the communication of deep philosophical researches, it would not be reasonable to expect as forthcoming, from a body composed of so many grades as ours, upon the Committee requesting papers. But the Committee have a right to expect, and we are bound to respond to their invitation to communicate papers such as will advance our profession, and raise higher its tone and character. Such progress, however, is not beyond the power of simple papers upon common subjects, if such be carefully and conscientiously dealt with—not vague expressions of vague opinions.

My views upon this subject will be made clearer to you by one or two examples. The case of Grafton's experience in the formation of carbon, and its removal, is much to the purpose perhaps more so than any that can be adduced. He says, in "Clegg's Treatise:"—"The most eminent scientific authorities considered the accumulation as the result of high heat, and too great an extent of heated surface." It will be remembered that a large premium was offered for the discovery of the cause, and, therefore, we may assume that, had a paper been prepared upon this subject it would have been dealt with in this vague and general manner. Now note the difference in the treatment of the subject by Grafton: "I increased," he says, "the pressure to 14 inches, keeping up the usual heats . . . . at the expiration of two months the deposit had reached 24 inches in thickness. . . . . I applied myself to the taking off the whole of the pressure, except the half-inch dip in the hydraulic. Under this change, the same retort was worked for four months and scarcely any deposit appeared." This might be taken as an admirable model for a paper—a simple subject, but a very important one—worked out in a masterly way, and communicated with the idea thoroughly defined, and with charming simplicity of style. Now compare Grafton's observations and experiments with the treatment a kindred subject has received—the stoppage of the ascension-pipes, and you will not fail to see the importance of what I am now pressing upon you. Again, take the case of a paper on "Unaccounted-for Gas," in which the writer dwells upon the fact that the loss, if the gas is properly condensed, arises from defective plant—holders, mains, services, meters, and public lamps. If the writer of such a paper went no further than the expression of an opinion that the chief loss arose from one or other portion of the plant, he would fail to make a communication to the Association; but if, from observation and experiment, he showed the loss from each portion of the plant, or that it was all, or nearly all, from the services or meters, and that by the use of another meter, and the adoption of other kinds of service-pipes, or a new system of laying them, the loss would be prevented, then he would make his paper a valuable communication.

Though I have thus urged upon you the duty of communicating papers that may advance the professional character of our calling, yet it is no less the duty of the Members and Associates, than the aim of the Association, to discuss "all matters connected with the manufacture and distribution of gas and its products." Not as members of a professional Association only have we to meet, but as manufacturers and traders engaged in the same business—a business of great magnitude, in which large interests are at stake, and affecting every community. The papers, therefore, of the commercial portion of our business should be as carefully prepared as the professional, and, in their discussion, there should be a deep sense of the responsibility of our individual positions. Ours is not a private business, it must always be borne in mind, and also that the public have a pecuniary interest in our undertakings. It is a matter of regret, I think, that such Associations as ours were not established at an early period of our history, as they would have advanced our business, and, by the diffusion of information, have materially improved our relations with our customers individually and collectively. It is not to financial questions only that I allude, but to the want of a general knowledge of manufacture, distribution, and business. A very general impression prevails that the business is very simple, quite of an ordinary character, and very easily managed. The making of gas, indeed, is little more than throwing coals into an oven and allowing the gas to flow away through a pipe. Of the complex character of the manufacture, of the incessant, anxious care attending it, and of the beauty, delicacy, and great accuracy of the apparatus employed, very few persons but those actually engaged in the business have the remotest idea. And so, too, with the most important financial questions with which we have to do—price and capital, the former being dealt with irrespective of the other, and the latter without reference to antecedent prices affecting that capital. So is it with the comparative prices of different towns. They are dealt with, too, without any reference to disturbing causes, the lowest being invariably taken and applied as a measure to a remote district, and, unconsciously often, an injustice done to those honestly and zealously engaged in a business with no ordinary limitations and restrictions. But the general ignorance of gas matters is not confined to the working of such undertakings, it extends to the houses of the consumers, in the use of bad meters, bad fittings, and bad burners. The simple index, from the record of which the consumer is charged, is scarcely ever read, from the want of the knowledge to do so. The advantages of gas for other purposes than that of lighting have been but slowly recognized. Gas coke, an excellent and economical fuel, is almost ignored for ordinary domestic purposes.

We are beginning, I think, to feel that we are somewhat responsible for the ignorance which prevails, and which doubtless affects our interests. While admitting this, however, we must not lose sight of the fact that we have had an immense amount of prejudice to overcome—the prejudice of the consumer, and the prejudice, as well as the ignorance and interests, of intermediate workmen. From the latter we suffer as much as ever, and have little or no remedy, while the consumer can go from shop to shop seeking the lowest prices, without reference to the size of the pipes and the quality of the work. In this matter there is nothing in common between the consumer and fitter, but with the company and consumers there is an identity of interest. It is, therefore, much to be regretted that the attempt made some time since to schedule the size of pipes in an Act of Parliament was not successful, as this would have done much towards preventing that undue amount of competition which exists, and which offers a premium to the unconscientious shopkeeper, entirely excluding the honest tradesman with a position and reputation. With pipes of ample capacity in the interior of buildings, our pressures could be materially reduced to the advantage of the producer and consumer. If the weights of pipes were also scheduled, the advantage which the unconscientious man has over the honest trader would be reduced to a minimum, and less apparent advantage would be offered to the consumer. Add to this the power of the Company or Corporation to inspect fittings, and reject them, if not approved, at a small cost to the consumer or fitter, as they were satisfactory or otherwise, and all the annoyance that the consumer suffers would be at once got rid of. We should then cease to be in the present disgraceful position of having to employ an instrument for the so-called measurement of gas that is totally unreliable. Is it not a disgrace to us as professional men, as tradesmen (I leave out of sight the fact that we are the Managers of large undertakings, the representatives of Companies and Corporations), is it not a disgrace to us, I ask, that we should have to use an article that may vary to any extent, through the want of a little care and attention in running the pipes through a building; while with this care a meter can be used that will measure absolutely correctly? I may say, before leaving this, that for many years the Paris Gas Company, with their enormous business, have had the power of supervision and control over the fittings of the consumers.

With improvement in the canalization, might we not hope for improvements in the fittings, and so impress art as well as science into our service. There is great need of this, though considerable improvement has been made, and work designed with much taste. Progress will be very apparent on comparing an old with one of our best and latest pattern-books. It will be seen that real artistic progress has been made in the substitution of a natural and an elegant arrangement of decorated tubes for the massive and so-called classic grandeur of the suspended wash-hand basin and ewer. The combination of these tubes, however elegant, suspended from the ceiling, do not appear to me to do justice to the great adaptability of gas lighting. We have got into a deep rut of custom and prejudice in this matter; to light by brackets is much more elegant to my taste. The light is more diffused and pleasant, and arrangements can be better made for carrying off the products of combustion; but would not portable standards in some instances be more elegant, and in others external lights with stained glass windows, add grandeur and beauty to halls and staircases? These things are not beneath our notice; they will add beauty and comfort to our homes, they will improve the taste of the masses, and will materially increase our business.

In the application of gas to the warming of rooms, is there not, too, the running in the old rut of custom and prejudice—asbestos, fire-clay balls, &c., placed in a common open grate with a chimney that could not be better designed than it is for carrying off the heat as generated. The arrangement most desirable is the appearance of cheerfulness, and the utilization of as much heat as possible, without giving the stove the form of a closed one. In the matter of heating apparatus, the Stockton Exhibition certainly showed an improvement over those at Shields and Carlisle. Hence the value to the whole community of the inauguration of this movement—a movement which will be further developed, as is the case at Birmingham, and which will do much to remove the reproach from Companies that they have failed to educate and to popularize.

In the "Circular to Gas Companies" in the last issue of the JOURNAL OF GAS LIGHTING, the writer says: "Let all do their utmost to promote consumption." To popularize is to increase consumption. To make known the relative cost of gas and other modes of artificial light is to popularize gas; to show its safety, its adaptability, its salubrity, and the beautiful softness and controllability of the light, is to popularize it; to show its cleanliness, safety, and comfort in warming and heating is to popularize it; and to show its economy and efficiency for producing motive power at will is to popularize it. Here there is a large field in which we may work, together and separately, with great success, having, too, the goodwill and co-operation of the consumers. They having a common interest in this work with ourselves, both may be pecuniarily benefited; for to increase the consumption is to reduce the price; and, as these two act and re-act on each other, to reduce the price is to increase the consumption, and allow the cheering rays to penetrate the gloom of many a humble home.

At the formation of a Society such as ours, the President's attention, perforce, will be directed chiefly to the framing of a constitution, and to the setting forth of the objects of the Association in a general manner. I have felt this to be my duty, and however inadequately I may have done it, my desire has been, with your assistance and support, to place the Association on a sound basis. I have also attempted to give a direction to the current of your business, but you must mould it into shape, and give it a life of usefulness and honour. I have glanced at many subjects, but the real work is with you; only your papers and your discussions can reflect credit upon the Association, extend its usefulness, and promote its objects.

The meeting having thanked the President for his very interesting address,

Mr. HEPWORTH (Carlisle) read the following paper

ON WASTE IN GAS-WORKS.

It was recently remarked in the pages of the JOURNAL OF GAS LIGHTING that "in gas-works everything is utilizable—not a particle of matter to be found in the works should be wasted."

The proposition is one which, for the most part, ought to be self-evident, and to many who are engaged in the management of gas-works it doubtless is so; moreover, there are good grounds for saying that it has in many instances long been acted upon, to the great advantage of gas-works proprietors.

The proposition, however, is one worthy of being repeated and remembered; and it is in the hope of calling attention to its importance that the writer now ventures to offer some simple observations in illustration of it.

The term "waste," as applied to gas-works, may, in its broadest sense, be said to refer not only to the products of manufacture, which being once obtained are afterwards allowed to be partially lost, but also to those products which are neither manufactured nor sold to the best advantage.

As the question of *waste* not only affects the dividends, but also affords a test of *management*, it may certainly receive the brief attention of the members of this Association.

What are some of the sources of waste? 1. In the manufacture; and, 2, in the distribution of gas and its residual products.

In the Manufacture of Gas and Residual Products.

Fuel.—The coke used to carbonize coal amounts to about 20 per cent. on the make in several well-managed works; it has been even less than that, and possibly is now; but in many places it approaches 50 per cent., and there are other places (as where cannel is used) where even this per centage is much exceeded. The difference represented by these figures is not necessarily all waste, but may arise partly from the difference in the sizes and mode of setting retorts suitable to the varied requirements of different works. But when all this has been taken into account, there is still, in many instances, nothing less than gross waste in the fuel used as compared with the work performed.

It is impossible to fix a standard per centage of fuel to meet all cases, but where it much exceeds 25 per cent., the fact may be worth consideration under the head of waste. And when the greatest economy has been exercised, the residuary heat passing from the chimney into the atmosphere is quite sufficient to suggest at least a passing inquiry whether that could not to some extent be partially utilized, in more cases than it is, for raising steam and for other purposes.

Coal.—There is coal *and* coal. Local circumstances must decide the question as to the cheapest market for coal as respects price, but it needs not to be demonstrated now that a low-priced coal is not necessarily the cheapest; and apart from this phase of the question, and whatever coal is used, it is beyond dispute that waste is only of too common occurrence in the carbonization of coal. The writer knew a coal in use at three different works, and the yield of gas per ton at the respective works was 9600, 7280, and 6800 cubic feet. At the first only of these works an exhauster was used, but there was no reason (beyond that of parsimony) why an exhauster should not have been in use at all the works; and even *without* an exhauster, nothing can justify a waste of 2800 cubic feet, or nearly 30 per cent. of gas per ton of coal. It may be said that such instances are rare; certainly it is to be hoped so; but where the yield per ton is at all less than it is possible to obtain in ordinary practical working, it may fairly be described as waste, and ought to be remedied.

Waste from imperfect carbonization (as in the case of fuel) is probably caused chiefly by the defective setting of retorts; and at this day there can scarcely be an excuse left for ignorance as to the best mode of setting retorts.

Residual Products.—If the residual products arising from the manufacture of gas are looked into, it will be found that much waste now going on is preventible. There was a time when little or no demand existed for residual products of gas manufacture. Happily, that time is gone by.

Coke.—With respect to coke, all that need be said here has already been said under the head of "Fuel," unless it be a word to call attention to the waste which sometimes is allowed to arise from the ash-pits. If the coke cannot be picked out when the ash-pits are emptied, and if it will not "pay" to screen these ashes afterwards, then surely it might be possible, in places where fuel is costly and poverty rife, to give away rather than waste even so worthless a product.

Tar and Ammoniacal Liquor.—With respect to tar and ammoniacal liquor, probably no great difference exists in the quantity of tar produced per ton of coal at medium-sized works, and where the temperature of the retorts is nearly uniform. Greater difference exists in the quality and strength of ammoniacal liquor produced, and both are partly dependent upon the kind of coal used. Any comparisons to be instituted must, of course, be as between coals whose liquid products are similar. If the gas made be thoroughly condensed and thoroughly washed (in scrubbers or washers), there can be no difficulty in securing all the tar and liquor that can be profitably obtained. But so long as ammonia is allowed to go out with the gas, instead of being washed out and converted into sulphate, or some other marketable form of ammonia, absolute waste exists. Such waste is not uncommon. The sale of ammoniacal liquor per ton of coal at one work known to the writer is 22 gallons of 6° Twaddel; at another, 10 gallons of 4½° Twaddel; at another, *nil;* yet all these works are using similar kinds of coal, and are within reach of the same market for the liquor! The conclusions to be drawn from these figures are obvious.

Gas used on the Works.—The consumption of gas at the works is oftentimes excessive, simply because there is no account taken of the quantity consumed; and therefore no check applied. Let the gas be duly passed through a meter, and the index taken periodically and compared, and the consumption may be reduced to a legitimate quantity.

Having enumerated some of the sources of preventible waste in the manufacture of gas, what are some of the sources of waste

In the Distribution of Gas and its Residual Products?

Gas.—The per centage of unaccounted-for gas has, in recent years, been so much reduced in some of the largest works in the kingdom that very little opportunity remains for the further prevention of waste in this direction so far as those works are concerned. In three of the metropolitan gas-works the unaccounted-for gas in 1876 was under 6 per cent., and the average of the whole of the metropolitan works was only 6·38 per cent. Results much less favourable than these are more common in the provinces.

It was no common thing, a few years since, to hear of small gas-works where the unaccounted-for gas amounted to 25 per cent. of the gas made, and, for anything that appears to the contrary, had continued so for years in succession; and, as if to show how some companies, as well as individuals, are able to resign themselves to misfortune, the companies appear to have gone on cheerfully enduring the 25 per cent. loss, but compensated themselves once a year by dividing the modest dividend of 10 per cent. on their capital.

Mining districts excepted, there surely is no necessity for a leakage of above 10 per cent.

With this question others are involved, such as condensation, sound mains and services, and correct registration of meters; but with these matters attended to, why should there be a resting-place till the unaccounted-for gas is reduced to 5 per cent.?

Residual Products.—Any waste that occurs in the distribution of the residual products may readily be dealt with. Assuming that these products have been fully secured, the problem left is—How and where to sell or work up these residuals?

It may be remarked generally that, where a demand for any of these products does not exist, there is at least room for supposing that it may be created.

If coke cannot be sold in one market it may in another; but, if it cannot be sold as coke, can it be sold as breeze, or, as has been advocated, as fuel when mixed with tar? If the gas consumers will not come for the coke, it may be as well to take the coke to the gas consumers. There can be no difficulty in disposing of coke ultimately, and, in order to prevent waste, it is only necessary to ascertain which is the best market.

If the tar and liquor are not treated for other products, they can be sold. They certainly ought not to run to waste, as is the case in some small works. If the tar and liquor are sold, they should be sold to certain standards of strength agreed upon, and any deviations from the standard should be provided for in the contract by a scale of prices *pro ratâ*. They should also be sold by weight or by measure, and not for a lump sum. The writer knows of an instance where the revenue for tar has within the last twelve months been increased 150 per cent., and the revenue from ammoniacal liquor 600 per cent., by simply adopting these methods of selling these products.

If the tar and liquor, instead of being sold, are treated for other products, the possibilities of waste still exist, both in the mode of working, and in the returns obtained, which, under precisely similar circumstances, are often found to differ as much as 30 per cent.

There are other residual products yet to be dealt with, viz.:—

Refuse Lime, Ashes, &c.—The ashes produced at gas-works are, in some towns, in regular demand, and are sold at fair prices, while, at other works, there is not only no demand for them, but there is a great difficulty experienced in disposing of them, even by paying for cartage; and the same may be said of refuse lime, and even more, as there are greater difficulties in the way of its disposal.

The process for revivifying spent lime recently advocated may, where lime is costly, or where the spent lime is a nuisance difficult to dispose of, be the solution of a difficult question; but, in cases where no gain can be secured by the revivifying process, it may be as well to dispose of two difficulties at the same time, by converting the waste ashes, bricks, &c., and the spent lime, into a mortar, which may be used for luting in the retort-house, and which, with a portion of fresh lime added, may be readily sold to builders at a remunerative price.

Spent Oxide, Carbon, &c.—The various ways in which spent oxide and the carbon removed from retorts may be utilized, are so well known that there is no difficulty in profitably disposing of these products in works where they are found.

Other sources of waste doubtless exist, and other means of remedying such waste might have been suggested; but enough has been written to call attention to the subject. Only one observation need be added. In order to prevent waste in gas-works, let every Manager carefully analyze his own working results, and compare them with those of his neighbours similarly situated, and also with those of the best conducted works in any part of the country where these results are published. Such a comparison ought to lead to results that would be as creditable to the Manager himself as they would be profitable to the Company or Corporation whom he serves.

Mr. FORD, of Stockton, read the following paper on

OBSERVATIONS ON THE ELECTRIC LIGHT AS APPLIED TO WORKSHOPS, ETC.

The subject chosen for this paper is a pre-eminently interesting one to those professionally connected with the manufacture of artificial light, and my only regret is that the times and opportunities at my command, for the actual viewing of the electric light in operation, have unavoidably been so limited as to compel me to give but a short *résumé* of what might be written on the subject, were your time not to be otherwise occupied by contributed papers on other topics.

Much has, during the last little while, been said and written about the electric light, and the probability of its partially or entirely superseding the use of coal gas and other means of artificial illumination, and many doubts and fears have been expressed and acted upon from time to time, causing relative fluctuations in the commercial value of undertakings such as those with which most of us are in some way connected; but, hitherto, the *ultimatum* of each spasmodic action of this kind has been a return to the former and original value of the concerns alluded to. These periodical fluctuations may be principally attributed to the apparently successful experimental results which are from time to time brought before us by gentlemen in some cases devoting their entire time, means, and energies towards the further development of this kind of light, which has undoubtedly, by their efforts, been brought to a most wonderful stage of success. But experiments of this kind are generally conducted under circumstances the most favourable to a successful accomplishment of the end desired for the time being, and are usually wanting in many of the practical elements essential to a commercially useful and continuous application of the principles involved, so that when these principles come to be worked out in a manner calculated to be of practical utility, many failures, more or less complete, have to be encountered, and many difficulties to be overcome, before the end aimed at is reached.

This seems to have been especially the case in the employment of electricity for producing light. Many and numerous are the methods that have been tried to create, by its agency, an artificial light superior to any that was previously known, and the most successful of these has undoubtedly been what is commonly known as the electric candle, which seems to be neither more nor less than two currents of electricity communicated to two tapers of carbon, the points of which are maintained at a regulated distance, whilst the carbon particles of each taper are being consumed to create the light desired. It is not my intention to draw any invidious comparisons between the light thus created and that generated from gas coal, for such a comparison is beyond the scope of this paper; but my object is merely to give expression to some observations obtained from a view of such light in actual use in workshops of very considerable magni-

tude, and this I venture to do in the belief that such a sight is one of no little interest, and one which has, perhaps, not been personally inspected by all of us.

The apparatus which is used in producing the light I speak of is what is commonly known as Siemens's, and is of considerable magnitude, as the space it is desired to illuminate is extensive. There are two such in operation in different shops—one in a boiler-shed and one in a fitting-shop, both belonging to the same firm of engineers. The electricity required for the production of the light is generated by a powerful rotary drum (lined with insulated wires) which is driven speedily round its axis by a four-horse power engine, and against this drum gently impinge fixed brushes of brass with but little friction. The mechanical force thus employed creates the electricity, which is conveyed to coils of insulated wire, and these are in course conveyed from where the generator is stationed to such position as the electric lamp may be desired to stand; in this case a distance of about 120 feet. These wires are then connected to the carbon tapers or pencils, which are about 18 inches long and half an inch thick, and are so fixed (one from the top and one from the bottom) on a delicate and most ingeniously constructed self-adjusting instrument, called the lamp, by which the relative distance of the carbon points, when once adjusted by the operator, is maintained, checked, and regulated by the same currents of electricity which produce the light. One pair of carbons lasts about four hours, and requires to be replaced by a new set; but as the top carbon is consumed much the quicker of the two, lasting only about one-third of the time that the lower one lasts, the interruptions of the light are much more frequent and irregular than once in four hours.

The light from each of the two electric lamps that I speak of is intense in its brilliancy, and has, when looked at, a very decidedly dazzling effect on the eyes, somewhat akin to that experienced when one looks at the sun with the naked eye. The lighting portion of the arrangement is elevated a considerable distance from the ground level, in order to diffuse the light as much as possible, and to obviate the discomfort occasioned by its effects on the eyes, and the light created shines a beautiful white clear light, brighter in quality, but somewhat like in colour to the light reflected from the moon at its full on a very clear night, and it gives the coal gas flames which are seen in its neighbourhood a dull, yellow, candle-like appearance, which contrasts unfavourably with its clearer rival. Where the light from the electric lamp is obstructed by workshop materials or tools, a dense dark shadow is cast behind these, and it is here that the coal gas proves its almost infinite divisibility, and is used to disperse the darkness occasioned by the brighter light, which cannot thus be subdivided. These shadows might, or may possibly through time, be partly lightened by the use of reflectors, arranged in suitable positions to throw back the light, instead of having recourse to gas-jets; but it seems to me that this is in some cases almost impracticable from the fact that the reflectors would require to be continuously moved or in motion to obtain the desired effect, and, where economy in the lighting arrangement is the desideratum, this would add much to the cost of the electric light. The effect of the new light, as used in the boiler-shed, seemed to me to be more agreeable and less pernicious to the eyesight than in the fitting-shop; for, in the latter, where the fittings and tools are principally formed from polished metals, the reflection is more severe than in the former, where the dull iron is generally used, and from the reflection from which comparatively little discomfort is experienced.

The fact of the carbon points being so quickly consumed, and requiring so much—almost constant—attention, and the variability of the distance of the carbon points from each other, caused by the more or less rapid and eccentric consumption of the carbon particles—a defect which even the beautiful adjusting mechanism cannot altogether obviate instantaneously—are drawbacks against the use of this beautiful light; for as soon as the distance of the points is varied, so soon is the intensity of the light affected, and lessened or increased, as the case may be, thus giving to the light a dangerously fluctuating effect in general (which is far from pleasant), and in some cases totally extinguishing it, both faults of a very serious nature, when it is considered that, without the assistance of the constant and reliable coal gas supply, the danger, inconvenience, and expense of such irregularities as those of this electric light are such as to lead to the destruction or damage of the materials, workmanship, and tools for the guidance of which the light is intended. A supply of coal gas must also be necessary at each change—and they are frequent—of carbon points, unless the place could afford to be in total darkness whilst the operation is being conducted, or a second electric lamp be fixed, to work whilst the first is having its carbons rearranged.

The lamp, properly so called, is, in itself, as I have said, a most ingenious automatic arrangement, very delicate in its action, and therefore liable, one would think, to get out of order; certainly it takes a deal of attending to while in operation, and requires almost constant watching.

It may be well for me to mention here that the two electric lights alluded to in my observations were not brought into use with a view to economize coal gas, nor have they tended towards such a result. The object aimed at was the clearer illumination of the area enclosed by the buildings, and in this respect they seem to answer admirably.

I hope on some future occasion to enter more fully into detail as to the comparative cost, utility, convenience, and physical effects of light from coal gas, as compared with those of the electric light; but on the face of observations such as those I have had, it seems clear that the light given by electricity as much transcends the quality of that produced from coal, as do the indefinite divisibility, cleanliness, and ease in application of coal gas exceed these attributes as applied to the electric light.

The Chairman said he had seen the electric light in a boiler-shed a short time since, and the effect of the light on the eye was such that he felt it on the following day.

Mr. Nelson (Glasgow) said that he had taken considerable interest in the light when it was first introduced. He had seen it used at the Tay Bridge, to enable the men to work there at night, when gas could not be employed. It was eminently useful. In connection with docks it was very applicable; but he thought the promoters of the light were damaging their own interests by pushing it into a position to compete with gas. He did not think that it could, in its present form, compete with gas, not even in workshops, and certainly not in dwelling-houses. One great objection to its being used in workshops was that it did not diffuse itself like gas, and left shadows behind every article.

Mr. W. Smith (Darlington) said that the cost of the electric light was too enormous to use in private dwellings, workshops, or yards, but it might do for lighting large squares in towns.

Mr. Hardie (Newcastle) said the light was now being exhibited in the Art Gallery of Newcastle, and, although very brilliant, was rather offensive to the naked eye. It had been said that it was equal to 6000 candles, and rivalled the light of the sun; but this was, no doubt, a momentary enthusiasm which would soon pass away. There had been no improvement in the light itself, which was the same as many of them had seen at different times during the last quarter of a century, but there had been an immense improvement in the apparatus for producing it. Its two defect, however, remained—namely, its intensity and uncertainty.

(To be continued.)

Rochdale Corporation Water-Works.—At the annual meeting of the Rochdale Town Council, on Thursday, the 2nd inst., the Town Clerk read the following, which is the annual report of the Water Committee:—

The Water-Works Committee report that during the past year there has been the following increase in the number of tenants and the amounts of the water-rental, viz.:—

Water-rate for the year ending March 25, 1878		£17,629	7 2½
Do.	Do. 1877	16,802	9 11½
Showing an increase of		£826	17 3
Number of tenants supplied, March 25, 1878		19,027	
Do.	Do. 1877	18,697	
Showing an increase of		330	

The filling of Cowm reservoir was commenced in January, 1877, and in July of that year it overflowed for several days, and continued nearly full until the middle of August, when, in consequence of appearances which indicated that the puddle was again being abraded by the action of water, at a point more westerly than had been before noticed, it was decided, under Mr. Hawksley's advice, to empty the reservoir, and to sink a trench commencing at the west end of the wall previously put in, parallel with and next to the puddle, so as to ascertain the precise point at which the mischief was going on. This trench was opened for a length of 72 feet, and to a depth of 95 feet, and it was discovered that owing to the wash of water rushing into the large fissures in the rock lying under the shale, the puddle was being damaged in various places. It was then resolved to construct a concrete wall against the side of the puddle, to protect it from this wash. This is now being done, and it is intended to extend this wall for a certain further distance towards the west end, with a view to prevent any further abrasion of the puddle in this direction.

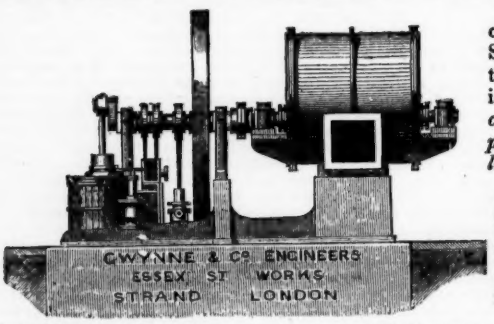
At Spring Mill the work is proceeding satisfactorily, nearly the whole of the brick-work and masonry in connection with the tunnel and shaft being completed, and the embankment and puddle gutter in a forward condition.

If the Cowm Reservoir had now been in operation, as we anticipated, the whole of the interest on the capital expended would have been charged to revenue, and a deficiency created which would have necessitated a rate during the ensuing financial year. Under the circumstances it has been deemed advisable to pay a portion of the interest, on the works in progress, out of the accrued profits, and for that purpose a sum of £6300 has been appropriated.

The question of pure water in connection with the health of the town and neighbourhood is of such vital importance that it should be generally known that the Corporation are now in a position to give a constant supply to the whole of their district.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS;
Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

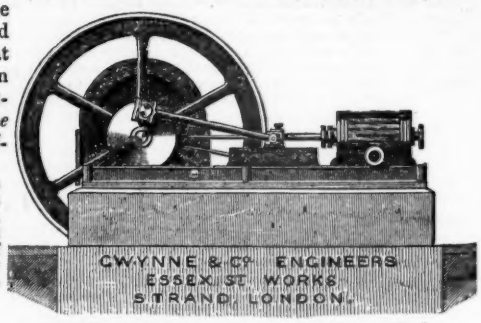
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

THE Advertiser seeks an engagement as FOREMAN of Retort Setters or RETORT SETTER by Contract or Day. Has been sole retort setter to the Crystal Palace District Gas Company for the past six years. Good references.
Address W. ROBUS, 31, Vance Street, Walpole Road, NEW CROSS, S.E.

A Young Man, aged 22, who has just finished a four years engagement with a provincial Gas Company is open to take a situation as Manager of small Gas-Works, or as Assistant to the Engineer of large Works. Can give first-class testimonials. Has no objection to go abroad.
Address No. 460, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a situation as Meter INSPECTOR. Would be glad to assist Fitter, and make himself useful at small Works.
Address No. 24, Tongend Lane, Whitworth, ROCHDALE.

CLERK OF WORKS OF GAS-TANKS.
WANTED, a re-engagement as above. Good references.
Address M. L., 2, Nelson's Place, Rupert Street, BIRMINGHAM.

WANTED immediately, a Steady WORKING FOREMAN, for small Gas-Works, who can Lay Mains and Services, do the General Repairs and Fitting on the Works, and is capable of taking charge of Works in the absence of the Manager.
Apply, with references, and state salary, to Mr. GEORGE SMEDLEY, Gas-Works, BUXTON.

WANTED, a good Draughtsman in the London Office of a Firm of General Engineers. He must have a thorough knowledge of Hydraulic and Steam Machinery. One who has also had experience in setting out Gas-Works Plant will be preferred.
Apply, by letter, with references to previous employers, stating qualifications, salary expected, &c., to A.B., care of Mr. W. M. Wills, 57, KING WILLIAM STREET, E.C.

GRAND JUNCTION WATER-WORKS COMPANY.
THE Court of Directors of the Grand Junction Water-Works Company propose to appoint an officer under the title of SURVEYOR and SUPERINTENDENT of WATER-RENTALS, &c., with a salary of £350 per annum and an official residence, with coals and light, at their district office.
The duties of the office will include the Supervision of all Valuations and Assessments, and of the correctness of the Water-Rentals charged by the Company, likewise of the Domestic House Services and of the Meters and Meter Services, together with a control over all Fittings, such as ferrules, ball-taps, &c., and the performance of all other acts and duties in connection with the above matters which may, under any order of the Court, be required.
Applications, with copies of testimonials, to be addressed to E. O. Coe, Esq., Secretary, at the Company's Offices, 65, South Molton Street, London, W., on or before the 1st of June next.
By order,
E. O. COE, Secretary.
May 1, 1878.

WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas; on Burners," &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

WANTED, Orders for Samples to test the superior Silkstone, Wigan, and other Gas Coals and Cannel on Sale by G. J. EVERSON, Gas Coal and Cannel Contractor, BIRMINGHAM.
N.B.—Prices on personal application, or by post or telegram, on shortest notice, and prompt delivery.

SULPHATE OF AMMONIA PLANT.
THE above Plant, erected on the newest and most improved method, at less than half the cost of other plans, gives better results, requires less labour, and allows no gases or offensive smell to escape. Reference kindly permitted to manufacturers as to efficiency and cheapness of plant &c.
For particulars, address JOHN G. HARVEY, Chemical Works, Little Island CORK.

SPENT OXIDE OF IRON.
WE are open to Buy this in any quan- tity.
Address, with price, to NICHOLSON AND SONS, Chemical Works, Hunslet, near LEEDS.

NOTICE TO MANAGERS OF GAS COMPANIES.
THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to
FRANK M'GEDY, Secretary.
126, Chancery Lane, London.

ON SALE—One Station-Meter, to pass 1000 cubic feet per hour. Almost new. Will be sold cheap.
Apply to J. HALL, Gas-Works, St. Helen's, LANCS.

MR. SCAMELL will Sell by Auction, at No. 21, Old Bond Street, on Tuesday, the 21st inst., and following day, an extensive and varied assortment of Gaseliers; Hall Lobby Lamps, Pendants, Brackets; Bib, Elbow, Main, Stop, Union, Backing, Range, Diaphragm, Ball, and Tube Cocks; Bath Plates; Steam-Cocks; 90 Stidder's Patent Closets and Urinals complete; about 500 blue and white Wash-Hand and Closet Basins and Basin Slabs; 12 sets Stocks and Dies, Cramps; Tube Cutters; a large quantity of Valves, Jets, Unions, Elbows, and General Gas-Fittings.
May be viewed on Monday, the 20th inst., and catalogues had on the premises, and of Mr. SCAMELL, 40, Upper Thames Street, LONDON.

GASHOLDER, now at work, and in good condition, FOR SALE; 45 ft. diameter, 18 ft. deep; Six Columns and Girders, with Chains and Balance-weights.
Apply to the Horseley Company, Limited, Tipton, STAFFORDSHIRE.

TO BE SOLD—Colyton Gas-Works, Devonshire.
For price and particulars, apply to J. W. DAVIS, George Street, HULL.

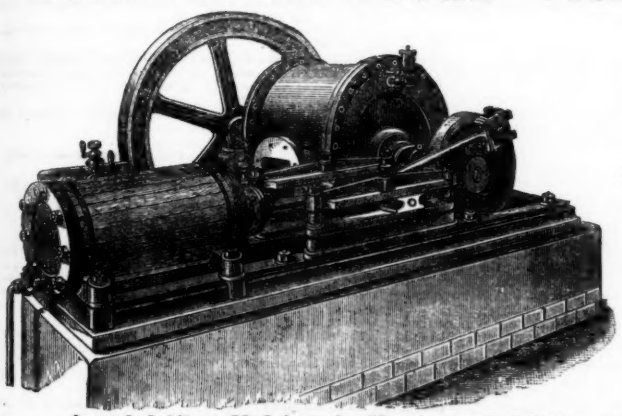
ON SALE—A Station-Meter (with new Drum), capable of passing 10,000 cubic feet per hour, with Hydraulic Valves, Bye-Pass, &c.; 10-in. Connections. Has been removed to make room for one of larger capacity.
For particulars and price, apply to GEORGE NEWTON, Gas-Meter Manufacturer, Union Street West, OLDHAM.

FOR SALE—Two Purifiers, 12 ft. by 4 ft. 6 in., with Wood Grids, Lifting Tackle, and Hydraulic Valve. All in excellent condition. Parted with in consequence of being replaced by larger ones.
Apply to G. ROSS, Gas-Works, STONEHAVEN.

TO GAS COMPANIES AND BROKERS.
THE Radcliffe and Pilkington Gas Com- pany have ON SALE the following Apparatus, &c., viz.:—
One Vertical High-pressure Steam-Engine, 6-in. cylinder, 12-in. stroke, with Fly-Wheel and Pump complete.
Two 10-in. Exhausters, 12-in. cylinders, 16-in. stroke, with Horizontal Steam-Engine attached, 7-in. cylinder, 12-in. stroke; one Governor; one set of 9-in. Condensers; two 10-in. overground Valves; two 10-in. underground Valves; all nearly new, by Dempster, of Elland.
Two 7-in. Exhausters, 15-in. stroke; three Valves, 7 in.; and one 7-in. Bye-pass Valve.
One 18-in. Governor, with three 18-in. Valves.
One 12-in. Governor, with inlet, outlet, and bye-pass Trap-Boxes.
One Station-Meter, 6 ft. by 4 ft., by Barnes and Roper, Wigan.
One four-way 12-in. Centre Valve, with Lifting Gear for purifiers, and all Connections to and from the purifiers.
One set of 8-in. Condensers.
One set of 7-in. Condensers.
90 D Retorts, iron mouthpieces, 16 in. by 14 in.
A quantity of old metal.
The materials offered may be inspected at the works of the above Company, Sion Street, Radcliffe, near Manchester, and all information may be obtained from the Company's Manager.
The whole of the above-named materials are open for sale by private treaty, and if not so disposed of will be sold by public auction.
By order,
JNO. BRANDWOOD, Manager and Secretary.
Gas-Works, Radcliffe, May 3, 1878.

ROSSENDALE UNION GAS COMPANY.
TENDERS are invited for the Supply of COAL and CANNEL for a term of One, Two, or Three years, from the 30th day of June next.
Quantity required per annum, about 9000 Tons of Coal and 5000 Tons of Cannel.
Tenders to be sent in not later than July 1, 1878, and addressed to the Chairman of the Gas Company, endorsed "Tender for Cannel and Coal."
WILLIAM BLACKLEDGE, Manager.
Clough Fold, near Manchester, May 6, 1878.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS



WITH
Wrought-Iron Spindles and
ENGINES COMBINED.

SOLE MAKERS,
GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS,
INDEX AND DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, AND OTHER PUMPS,
SCRUBBERS AND PURIFIERS,
CONDENSERS, BOILERS, &c.

Awarded Silver Medal at the Manchester Exhibition of the Society for the Promotion of Scientific Industry.

Phœnix Engineering Works:
HOLLAND STREET, SOUTHWARK, S.E.

TO GAS ENGINEERS.

D. BRUCE PEEBLES & CO.

Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS, BONNINGTON, EDINBURGH.

THE Directors of the Mansfield Gas Company invite TENDERS for the Supply of 4100 Tons of Best Screened GAS COAL, to be supplied from June 1, 1878, to May 31, 1879, in the following proportions:—

200 Tons each in June and July, 1878.
450 Tons each in August, September, October, November, and December, 1878, and January, 1879.
350 Tons in February, 1879.
250 Tons in March, 1879.
200 Tons each in April and May, 1879.

Or such other quantities as may be desired in similar proportions. The Coal to be 21 cwt. to the ton, delivered at Mansfield Station, and free from sulphur, bats, bind, and refuse.

Tenders to be sent in on or before Friday, the 17th day of May, addressed to

W. H. HANCOCK, Manager.

Gas-Works, Mansfield.

TO GAS COMPANIES AND OTHERS.

THE Stalybridge Gas Company have for Sale, at their Mossley Works—

One 14-inch Station Governor.

Two lengths wrought-iron Hydraulic Main, 20 in. diameter, each 32 ft. 10 in. long, fitted for Emmott's ovens; with all the necessary pipes, cast-iron fronts, mouthpieces, &c., for 8 ovens.

Also wrought-iron Buckstaves, made of 6 in. angle iron, 6 double and 4 single, each 9 ft. 5 in. long, and wrought-iron Lids for retorts and ovens as above.

The Company have also at their Stalybridge Works—

One 12-in. Centre Valve for 4 purifiers, Newton, Chambers, and Co.'s make.

Four wrought-iron Purifier Covers, 12 ft. 6 in. square and 15 in. deep, weighing about 16 cwt. each, together with cast-iron Girders and Lifting Gear complete.

All the above are in good condition, and may be seen on application to Mr. ROBERT HUNTER, Manager, Gas-Works, Stalybridge, of whom any further particulars may be obtained.

Stalybridge, April 11, 1878.

SHAFTESBURY GAS-WORKS.

WANTED, Quotations for Tar and Liquor, delivered in barrels at Railway Station, Semley.

Address THORNELOE and Co., Lessees, 57, Barbican, LONDON, E.C.

TENDERS FOR COALS.

THE Directors of the Dorking Gas Company are prepared to receive TENDERS for the Supply of about 1500 Tons (or such other quantity as may be required) of New Pelton, Pelaw Main, Pearith, or other approved GAS COAL, to be delivered free at the Dorking Station of the South-Eastern Railway.

Payment, by cash, two months from date of delivery, which can be arranged by application after the first delivery of 100 Tons, which must be on the Company's Works on or before July 3rd next.

Tenders to be addressed to the undersigned by June 15th next.

The Directors do not pledge themselves to accept the lowest or any tender.

WALTER PHILPS, Secretary and Manager.

Gas-Works, Dorking, May 10, 1878.

TO GASHOLDER AND TANK BUILDERS.

THE Directors of the Sleaford Gas Com- pany, Limited, are desirous to receive TENDERS to take down a 54 ft. by 18 ft. GASHOLDER; also a Wrought Iron TANK, 56 ft. by 18½ ft., with Columns, Girders, Mains, Valves, &c., now at the Gas-Works, Bilston, Staffordshire, and erect the same at the Gas-Works, Sleaford, Lincolnshire.

Specifications may be had gratis.

Apply to T. H. BOUTTELL, Manager and Analyst, Gas-Works, Sleaford.

May 4, 1878.

TO COAL MERCHANTS, SHIPOWNERS, AND OTHERS.

THE Directors of the Torquay Gas Com- pany are prepared to receive TENDERS for the Supply of about 6000 Tons (or such other quantity as may be agreed on) of Pelaw Main, Waldridge, Pelton, New Pelton, Pearth, or other approved GAS COAL. About 700 tons per month to be delivered during June, July, August, September, and October, and the remainder at the rate of about 500 tons per month during the succeeding five months.

Tenders to state the price of the Coal, and the freight to Dartmouth, separately and together; and also for delivery into the Company's Works, adjoining the Dartmouth Railway, free of all charges.

Payment by cash for freight on delivery, and by three months bill for the Coal.

Further particulars to be obtained from Mr. Greenfield, the Manager of the Company, Hollacombe, Paignton; and tenders to be sent to the undersigned, on or before the 18th day of May inst.

By order,
J. KITSON, Secretary.

Torquay, May 2, 1878.

AYLESBURY GASLIGHT AND COKE COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of 2000 Tons of GAS COAL. The deliveries to extend to One year from the 30th day of June next.

Tenders, quoting price per ton delivered free at the London and North-Western Railway Station, Aylesbury, to be endorsed "Tender for Coal," and must be delivered before the 1st of June next to the Secretary, Mr. JOSEPH PARROTT, Bourbon Street, Aylesbury, from whom any further information may be obtained.

Aylesbury, May 4, 1878.

COAL CONTRACT.

THE Gas Committee of the Carnarvon Corporation are prepared to receive TENDERS for the Supply of 2000 Tons of Best GAS COALS, to be delivered during Twelve months ending July 31, 1879. Rate of delivery as per orders of Manager.

Sealed tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Gas Committee, Guildhall, Carnarvon, to be sent in not later than the 31st of May inst.

Further information may be obtained on application to

MAT. J. PARSONS, Manager.

Carnarvon, May 8, 1878.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY, 589, Old Kent Road, S.E.

NOTICE is hereby given that an EXTRAORDINARY GENERAL MEETING of this Company will be held at Two o'clock on Monday, the 3rd day of June next, at the Terminus Hotel, London Bridge Station, in the borough of Southwark, for the purpose of increasing the number of the Directors of the Company by the appointment of an additional Director; and to confirm the resolution passed at the last Half-Yearly Meeting, for increasing the remuneration of the Directors.

Any Proprietor, holding shares on which £2000 has been paid up, intending to become a Candidate for the office of Director, must give notice, in writing, at the Office of the Company at least 14 days previously to the date of election.—Dated this 6th day of May, 1878.

By order of the Board,
GEORGE LIVESEY, Secretary and Engineer.

N.B.—Proxies to be available for the Meeting must be transmitted to the Secretary of the Company two days, at least, before the Meeting.

BAHIA GAS COMPANY, LIMITED.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Company's Office, 10, Coleman Street, London, on THURSDAY, the 23rd day of May, 1878, to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, and for general purposes.

The chair will be taken at Half-past Three o'clock precisely.

By order of the Board,
ALFRED J. HEAD, Secretary.

May 9, 1878.

BOROUGH OF HAVERFORDWEST.

THE Haverfordwest Town Council are prepared to receive TENDERS for their Surplus Stock of TAR, consisting of about 7000 Gallons.

Tenders, endorsed "Tender for Tar," to be sent to Wm. Williams, Esq., Mayor, on or before the 28th inst.

The Town Council do not bind themselves to accept the highest or any tender.

For further particulars apply to the undersigned.

J. GIBBON, Manager.

Gas-Works, Haverfordwest, May 11, 1878.

WESTON-SUPER-MARE GASLIGHT COMPANY.

IN reference to the Notice for the Dis- posal of Tar and Ammoniacal Liquor which appeared in this JOURNAL on the 23rd of April last, the Directors hereby give Notice that tenders for the same must be sent to Mr. John Perry, the Manager, not later than the 31st of May inst.

W. H. DAVIES, Secretary.

Dated May 11, 1878.

BOROUGH OF DARLINGTON.

THE Gas-Works Committee invite TENDERS for the Supply of 7000 Tons of CANNEL COAL, the whole quantity required from the 1st of July next to 1st of July, 1881; also for 2500 Tons required from 1st of July next to 1st of July, 1879, and for 5000 Tons required from 1st of July next to 1st of July, 1880.

The Coal to be delivered at the Stockton and Darlington Railway Depôt, Darlington.

Further particulars as to rate of delivery may be obtained of Mr. Wm. Smith, Gas-Works Manager, Darlington.

Tenders, endorsed "Tender for Cannel Coal," to be sent to me on or before Monday, the 27th inst.

No pledge is given that the lowest or any tender will be accepted.

By order,
HUGH DUNN, Town Clerk.

Darlington, May 4, 1878.

TO COAL PROPRIETORS.

THE Directors of the Cheltenham Gas- light and Coke Company invite TENDERS for the Supply of the best quality of COAL for making Gas, for Twelve months, from the 1st of July next.

For quantities, particulars, and conditions of contract, application to be made to the Company's Engineer.

Sealed tenders, addressed to the Engineer, must be forwarded on or before Thursday, the 23rd inst.

R. O. PATERSON, Engineer.

Gas-Works, Cheltenham, May 10, 1878.

GAS-WORKS, WORMWOOD SCRUBS.

THE Directors of the New Gas Com- pany, Limited, invite TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR produced at their Works as above, for a term of One or Two years, from the 21st of June next.

The Contractor will have to pay all expenses of carriage, and keep the Company provided with a good stock of sound barrels.

The quantity of Coal carbonized is about 4000 Tons per annum.

Sealed tenders, endorsed "Tender for Tar and Liquor," to be sent to the Secretary of the Company, 29, Walbrook, E.C., not later than Wednesday, the 29th inst.

Full particulars may be obtained of the undersigned,
CHAS. E. BOTLEY, Engineer, &c.

Gas-Works, Wormwood Scrubs,
Kensal Town, W., May 10, 1878.

THE MAGHULL GAS COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for the Erection of GAS-WORKS at Maghull.

Contract No. 1.—Erection of Manager's House, Coal Stores, Retort-House, Purifier-Shed, and other Buildings.

Contract No. 2.—The excavation and brickwork of a Gasholder-Tank.

Contract No. 3.—All Ironwork, Retorts, Fittings' Hydraulic Main, Condensers, Washer, Purifiers, Gasholder, &c., and all connecting Pipes and Valves.

The drawings and specifications may be seen on and after the 27th inst., and tenders must be delivered at the Secretary's Office, Maghull, Liverpool, on or before the 3rd of June.

Further particulars may be obtained from Mr. J. T. HALL, Engineer, Prescot.

The Directors do not bind themselves to accept the lowest or any tender.

By order.

Maghull, Liverpool, May 11, 1878.

TENDERS FOR AMMONIACAL LIQUOR.

THE Gas Committee of the Dewsbury Corporation are prepared to receive TENDERS for One, Two, or Three years (as may be agreed upon) for the purchase of the AMMONIACAL LIQUOR produced at their new Gas-Works, Savile Town, which are situated close to the canal. Quantity of Coals carbonized about 13,000 Tons per annum.

Any further information may be had on application to the undersigned.

Sealed tenders, endorsed "Tender for Ammoniacal Liquor," to be sent to Jesse Smith, Esq., Town Clerk, on or before the 11th day of June next.

The Committee do not bind themselves to accept the lowest or any tender.

CHAS. ARMITAGE, Engineer and Manager.

Gas-Works, Dewsbury, May 11, 1878.

BOROUGH OF HALIFAX.

TO COLLIERY PROPRIETORS.

THE Gas-Works Committee invite TENDERS for the Supplying of 20,000 Tons of GAS COAL and 1000 Tons of CANNEL, to be delivered upon the Railway Siding at the Corporation Gas-Works. The whole to be supplied before April 30, 1879.

Printed particulars and forms of tender may be obtained on application to Mr. Wm. Carr, Engineer, Gas-Works, Halifax.

Tenders, properly endorsed, must be sent to me on or before Thursday, the 30th of May, inst.

By order,
A. C. FOSTER, Town Clerk.

Town Hall, Halifax, May 3, 1878.

COAL CONTRACT.

THE ABINGDON GASLIGHT AND COKE COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of 1500 Tons of GAS COAL, the deliveries to extend to One year, from the 1st day of August next.

Tenders, quoting price per Ton, delivered free at the Great Western Railway Station, Abingdon, must be delivered before the 4th of June next to the Secretary and Manager, Mr. JOHN ELY, Gas-Works, Abingdon, from whom any further information may be obtained.

Abingdon, May 10, 1878.

TAR AND AMMONIACAL LIQUOR CONTRACT.

THE ABINGDON GASLIGHT AND COKE COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for the Surplus TAR and AMMONIACAL LIQUOR produced at their Works (which can be delivered into boat on the River Thames) for One or Two years.

Tenders, quoting price per Ton, must be sent in by the 4th of June next to the Secretary and Manager, Mr. JOHN ELY, Gas-Works, Abingdon, from whom any further information may be obtained.

Abingdon, May 10, 1878.

BOROUGH OF BURY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Bury are prepared to receive TENDERS for GAS COAL and CANNEL for One, Two, or Three years, commencing on the 1st of August next, to be delivered free at the railway siding, Buckley Wells, or at the Corporation siding, Town's Yard, Fernhill, as may be required. Estimated quantity about 14,000 Tons of Coal and 5000 Tons of Cannel per annum.

Further particulars may be obtained at the Gas-Works, Elton, near Bury.

Tenders, endorsed "Tender for Coal and Cannel," stating the colliery from whence the fuel is proposed to be supplied, to be sent to me, the undersigned, on or before Wednesday, the 29th inst.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
FREDK. BULL, Town Clerk.

Corporation Offices, Bury, May 10, 1878.

BRISTOL UNITED GASLIGHT COMPANY.

SPECIFICATION AS TO SUPPLY OF COALS.

THE Directors of the Bristol United Gaslight Company invite TENDERS for the Supply of from 90,000 to 100,000 Tons of GAS COALS, during the Twelve months between the 1st of July, 1878, and the 1st of July, 1879, for use at the Works, situate respectively at Avon Street, St. Philip's, and Canon's Marsh, Bristol.

The Coal to be partly small and partly large or brush, and to be delivered in such monthly proportions as may be required in accordance with the season. The quality of the Coals must be good, dry, and free as possible from sulphur, bats, bind, refuse, and dirt.

Full particulars required of the Coals for which tenders may be submitted; and the Directors will be glad to receive chemical analyses thereof, and any information in relation to their properties for the manufacture of gas.

Parties tendering must state the maximum quantities of either small, large, or brush Coal they will undertake to deliver monthly, and it must be understood that the Directors are to be at liberty to accept the terms offered for any lesser quantities they may think fit.

Tenders to state the prices per ton f.o.b. (port of shipment to be named), or delivered at the Railway Station, Bristol, or at the Company's Gas-Works, Avon Street, or Canon's Marsh, and discount for cash monthly payments.

Payment will be made in accordance with the weight (20 cwt. to the Ton), as weighed upon the weigh-bridge of the Gas Company at their respective Stations.

Sealed tenders, to be addressed to the Chairman of Directors, Bristol United Gaslight Company, Canon's Marsh, Bristol, marked "Tender for Gas Coal," and delivered not later than Tuesday, the 21st of May inst.

HENRY H. TOWNSEND, Secretary.

Gaslight Offices, Bristol, May 9, 1878.

A PAMPHLET ON DIP-PIPES, &c., post free 6½d., on application to W. WHITE, Gas-Works, Abersychan, MON. See Reviews in the *Gas Trade Circular and Review*, March 29, 1878, and *Design and Work*, March 30, 1878.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

TAR AND LIQUOR CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR produced at their Works at Wandsworth, during the next Twelve months.

The Tar and Liquor to be removed by the Contractor, by barges, whenever required by the Company's Engineer. Monthly cash payments to be made.

The Directors do not bind themselves to accept the highest or any tender.

Tenders, marked "Tender for Tar, &c.," to be sent on or before the 20th inst.

North Street, Wandsworth, May 9, 1878.

Price 1s., on stout paper, in stiff paper cover,

ANALYSES OF SCOTCH COALS,

CANNEL, SPLINT, SHALE, &c., USED in the MANUFACTURE of GAS. By WILLIAM WALLACE, Ph. D., F.R.S.E., F.C.S., &c., Public Analyst and Gas Examiner for the City of Glasgow.

Price 5s., by post 5s. 3d., cloth, 8vo., gilt lettered,

SULPHUR COMPOUNDS IN GAS.

A full Report of the Evidence given before the Select Committee of the House of Commons on the Bills of The Gaslight and Coke Company and the Crystal Palace District Gas Company, Session 1877.

LONDON: W. B. KING,
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LIVERPOOL— SEEL STREET.

CADZOW COAL COMPANY,

LIMITED.

Cadzow Collieries, Hamilton (Lanarkshire).

Office: 161, Hope Street, Glasgow.

Report on the Cadzow Ell Coal.

By Dr. W. WALLACE, F.R.S.E., F.C.S., Gas Examiner for the City of Glasgow.

I have made a careful chemical analysis and practical assay of an average sample of the Ell Coal from Cadzow Colliery, received on the 5th inst., from Messrs. The Cadzow Coal Company, Hamilton, and have obtained the following results:—

Analysis.

Volatile matters	Gas, tar, &c.	34·03	
	Sulphur	·04	46·12
	Water, at 212° Fahr.	12·05	
Coke	Fixed carbon	52·90	
	Sulphur	·03	53·88
	Ash	·95	
			100·00

Coke (dry) per ton of Coal, 1205 lbs., or 10 cwts. 3 qrs. 1 lb

Analysis of the Coke (Dry).

Carbonaceous or combustible matter	98·18
Sulphur	·06
Ash	1·76
	100·00
Specific gravity of the coal	1·250
Weight of a cubic foot in pounds	77¾

Practical Results.

Gas per ton of coal at 60° F. and 30 in. bar.	10,122 cub. ft.
Illuminating power in standard sperm candles by Argand jet, consuming 5 cubic feet per hour	16·76 candles.
Value of one cubic foot of gas in grains of sperm	402
Equivalent of a ton of coal in pounds of sperm candles	581
Durability of one cubic foot of gas by 5-inch flame	42 min. 45 sec.
Gravity of the gas, air = 1000	448

Remarks.

The sample tested consisted of a complete section of the seam, 5 ft. 6 in. in thickness. The results show that this Coal is well adapted for the manufacture of gas and coke, both being for soft coal of very fine quality. Of the many hundreds of coal samples I have tested, I have not hitherto had one with so small a proportion of ash as the Cadzow Coal. WILLIAM WALLACE.

Chemical and Gas Laboratory,
138, Bath Street, Glasgow, March 15, 1878.

WILSON'S SAFETY AUTOMATIC PRESSURELESS DIP-PIPE SELF-CLEANING HYDRAULIC MAIN.

See Illustration and Description in JOURNAL OF GAS LIGHTING, *Dec.* 4.

Improved SCRUBBER, with Self-Acting Water Distributor.

Improved HYDRAULIC CENTRE-VALVE to work three or four purifiers.

Improved HYDRAULIC LIFT, by which one man can raise and remove purifier-covers of any size.

Plans and specifications prepared for New or for the Remodelling of existing Gas-Works.

Special Designs for Gas-Works for Tropical Climates.

Particulars, &c., to be had of the Patentee, Inventor, and Manufacturer, W. P. WILSON, Consulting Engineer, 80, Cannon Street, LONDON, E.C.

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SIZES from 2 In. to 48 In.

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Every Valve warranted perfectly Gas-tight.

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SOLE PROPRIETORS AND MANUFACTURERS OF WOLSTON'S CELEBRATED

TORBAY IRON PAINTS.

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.

LANTERN PANES & SLIPS, COLOURED TABLETS, &c., &c.,

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Are better and cheaper than Embossing. Trade Lists and Particulars of

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PATENT HYDRATED PEROXIDE OF IRON MATERIAL.

The Material is adapted specially for taking up sulphuretted hydrogen, and will simultaneously absorb any ammonia that may pass the scrubbers.

The spent oxide resulting from our Material is more valuable than that from natural oxide of iron, and manufacturing chemists buy it in preference.

The Material has now been in use during the past three years in most of the principal Gas-Works in Yorkshire and elsewhere.

It contains considerably less moisture than natural oxide of iron, and is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

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GREAT SAVING OF LABOUR.

ENOCH'S PATENT

PORTABLE DRILLING-MACHINE,

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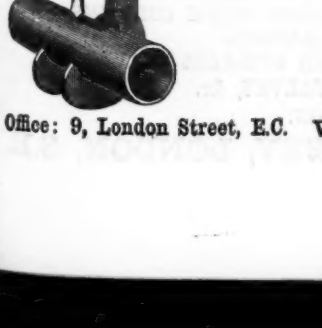

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F Size, for Services in Pipes, 2 to 4 in. bore	4 0 0
G Size, for Services in Pipes, 2 to 6 in. bore, with Telescope Cramp.	4 10 0

Drills, 1s. 6d. each.

Machines sent on approval, if desired.

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M. BREMOND'S NAPHTHALINE PROCESS.

All negotiations respecting M. Brémond's patented process for preventing Deposits of

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in Gas Main and Service Pipes should be addressed to Mr. W. H. Bennett, 22, Great George Street, Westminster, S.W., or to M. Bremond, Gas Engineer, Compania Madrilena de Alumbrado y Calefaccion por Gas, Madrid, who may be consulted upon all matters connected with the Gas Industry.

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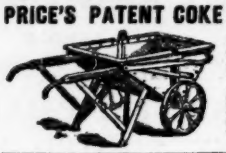
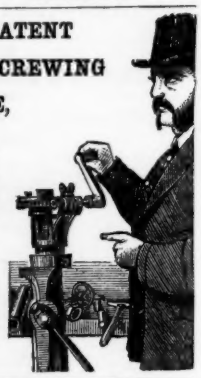
PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. Price, Inventor and Patentee, Gas-Works, Hampton Wick, Middlesex.

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,



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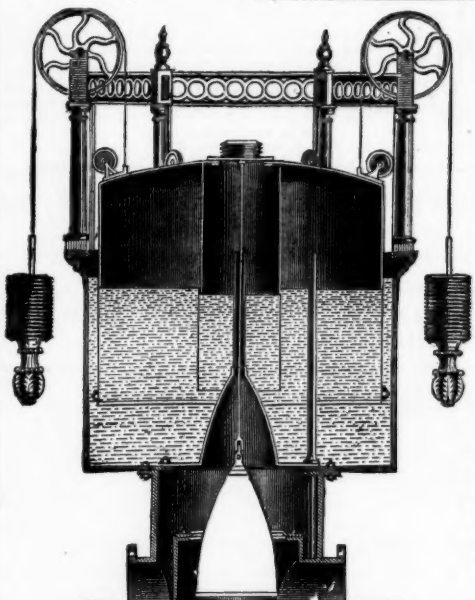
PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



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The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

J. BEALE'S NEW PATENT GAS EXHAUSTERS

MANUFACTURED SOLELY BY

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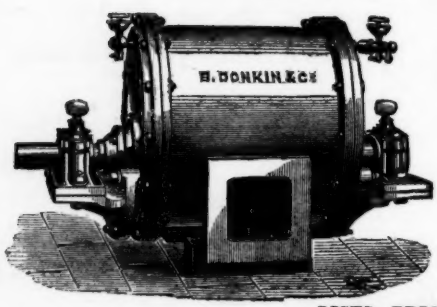

These Exhausters have but one solid slide, which ensures less wear and friction, and thus fewer repairs are necessary. They are made with two outside bearings and with all latest improvements.

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STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS.
IMPROVED GAS-VALVES.
VALVES FOR AMMONIACAL LIQUOR, TAR, and HYDRAULIC MAINS,
VALVES FOR SPECIAL PURPOSES, WITH COLUMNS, SCALES, AND GAUGES.
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SCREW WATER-VALVES, &c.

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WORKS: 55a, BLUE ANCHOR ROAD, BERMONDSEY, LONDON, S.E.

NOTICE.

THE GAS & WATER COMPANIES DIRECTORY, 1878.

(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,
8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

JAMES MILNE & SON,

GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
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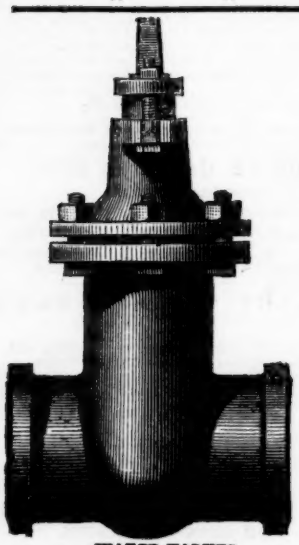

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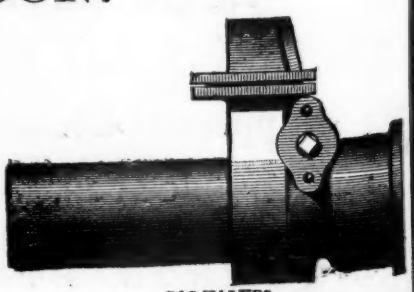

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Of the three essential conditions for this purpose—sound pipes, accurate measurement, and well-regulated pressure—the last two are covered by the following Patents held by our firm, viz.—

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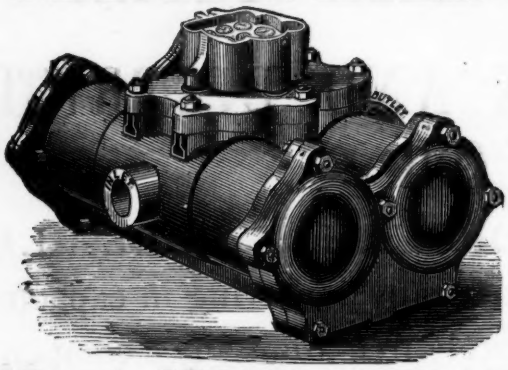

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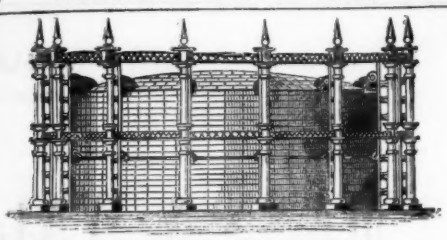

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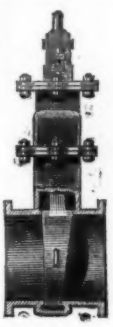

These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

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At a slight additional expense both flanges are faced to bolt to main-pipes.

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It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machine-room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

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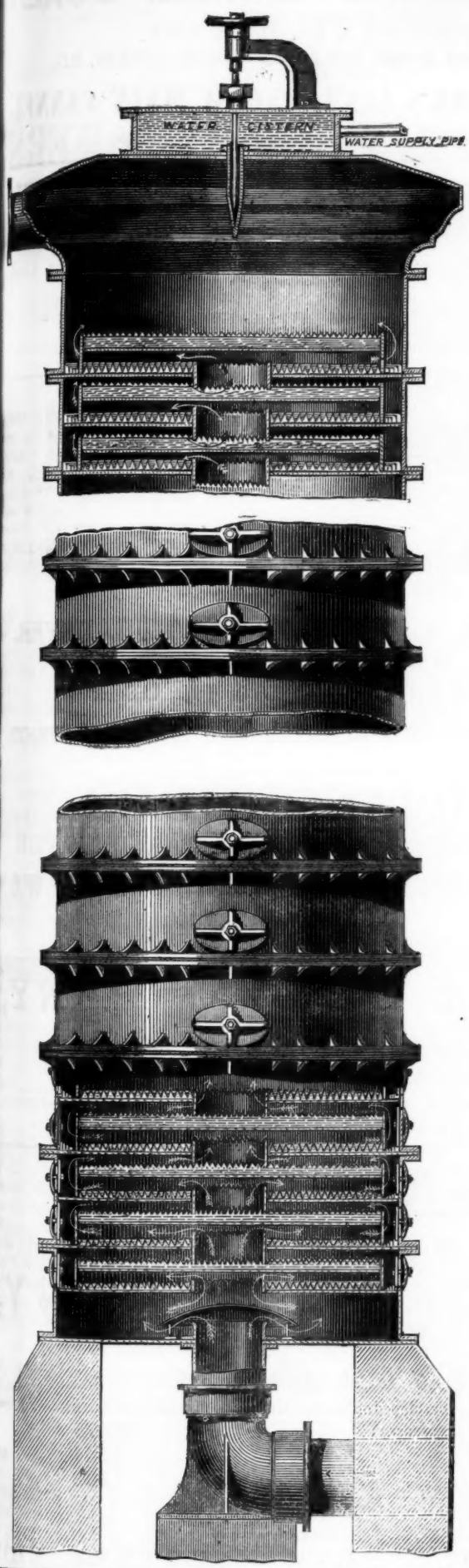

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DESCRIPTION OF CUTLER'S PATENT GAS-WASHER.

The Washer consists of a vessel or tower of a cylindrical or other form, convenient to the site available for it. The interior is fitted with a number of dished trays arranged as shown, one above the other, from bottom to top. The flanges or sides of these trays are formed with serrated edges, and are arranged so that each tray contains a certain depth of water or liquor; the position and size of the serrated orifices in the dipping edges being such that the upper parts are slightly above the water, and so that the combined area of these small orifices is proportionate to the size of the inlet-pipe, the gas passing through without increase of pressure, and diffused in thinly divided streams. All the other edges are likewise serrated, so that the liquor passes over same in small streams, and so that the gas cannot pass through in bulk. The water or washing liquor is admitted at the top, the supply being governed by a conical needle regulating-valve so that the amount can be regulated to any desired quantity. The gas is admitted at the bottom and out at the top, the water or liquor descending the one meeting the other, and thus being brought into the very closest contact, and the gas consequently being deprived of its ammonia and other impurities absorbed by water or other liquor.

Where a slight increase of pressure is not of great consequence, we prefer to allow some of the lower tier of trays to be slightly sealed, the better to arrest any tar or heavy oils that may have passed the condenser.

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Yields 13,320 cubic feet of 39·5-candle gas per ton.

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T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,594 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonised were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

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W. RICHARDSON, Fitter,
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LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,

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SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

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Supply to any Railway Station the best descriptions of Gas Coal, Nuts, and Cannel.

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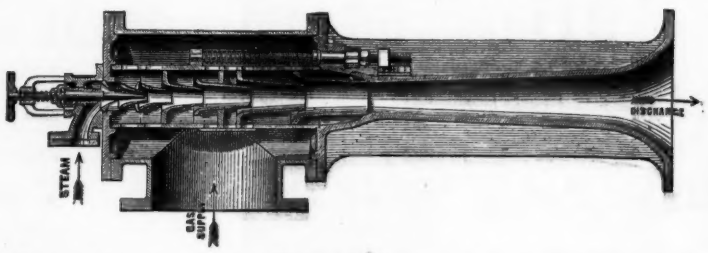

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THE WIGAN COAL & IRON COMPANY,

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Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

ALBERT GAS COAL.

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SILKSTONE COAL COMPANY,

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CAN OFFER A

GAS COAL

Of superior quality, delivered in trucks at any Railway Station in England, or shipped on board at Hull, Grimsby Docks, or Barrow-in-Furness.

Purified gas per ton of coal in cubic feet (average)	10,775
Illuminating power in candles	14·71
Weight of coke in lbs. per ton of coal	1,502

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

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THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

HYDRATED PURIFYING MATERIAL.

Samples on application.

MESSRS. SPENCE BROS., LIMITED,

Will be glad to supply the above on the most favourable terms,

And to treat, by Purchase or Exchange, for Spent Oxide.

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ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

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CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

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Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

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Full particulars will be sent on application to us—address as above.

NEW PATENT WET GAS-METER,

THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

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METERS, BOXES, REGULATORS, AND ALL REQUISITES FOR PUBLIC LIGHTING.

TESTING APPARATUS for all purposes relating to Gas, &c.

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THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

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Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

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